INTERNATIONAL WORKSHOP ON ENVIRONMENTAL HEALTH

CHILDREN'S ASTHMA

Mumbai, 14-15 June, 2005

PARTNERSHIP APPROACH

Sharing community-based intervention
experiences & solutions between two mega-cities : Mumbai and New York City

PROCEEDINGS

Cerana FOUNDATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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Indian Associaton for Air Pollution Control

cpcb

ANDHRA PRADESH
APPCB

nina
National Initiative for Asthma Management

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12. Asthma Partnership, New York City, New York
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359, "Srinivasa Nilaya"
Jakkasandra 1st Main,
1st Block, Koramangala,
BANGALORE - 560 034.
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e-mail : chc@sochara.org

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D 101, Highrise Apartments, Lower Tankbund Road,
Hyderabad 500 080
Telefax: +91 40 2753 6128
Email: ceranafdn@rediffmail.com

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Foreword

Air pollution has become a serious problem in north nations and in many rapidly developing south nations, and with it, so have its health effects. The World Health Organization estimates the number of asthma-affected people worldwide to exceed 300 million, of whom nearly 200,000 die every year. The human and economic burden associated with asthma surpasses that of HIV/AIDS and tuberculosis combined. Estimates of air pollution-related injury in India are, at the very minimum, 100,000 excess deaths and 25 million excess illnesses per year. In urban India, asthma prevalence rates exceed 10%.

Given this background, Cerana Foundation and US Environmental Protection Agency decided to highlight the issue of air pollution and environmental health, with particular emphasis on children's asthma, by organizing an international workshop in Mumbai on 14-15 June 2005. The objectives of the workshop were:

- To develop an action plan to minimize air pollution and its health effects
- To encourage coalition building between affected communities and other stakeholders
- To share asthma intervention programme experiences from Mumbai and New York
- To encourage partnerships between Mumbai and New York-based organizations

The workshop was attended by about 80 persons—asthmatics—children and adults, community health workers, doctors, nurses, environmental scientists and engineers, government regulators, non-government organizations, environmental activists, communicators, journalists, lawyers, students, etc.

The plenary sessions of the workshop discussed:

- Air pollution health impacts, and air pollution management—Mumbai and New York
- Responses to air pollution and its health impacts—regulatory, medical and community
- Asthma intervention programmes—community based, alternative medical systems; legal interventions and role of the media

The breakout sessions of the workshop were designed to:

- Make action plans for air quality management interventions, including develop approaches to help minimize exposure to air pollution
- Make action plans for asthma management interventions, including improve management of asthma, train asthma patients and communities to recognize air pollution-related health effects, etc
- Make action plans for doing community interventions, including encourage coalition building between affected communities and those working on air pollution and its health effects, develop demonstration models to implement the workshop's recommendations, etc

- Create partnerships between government agencies and non-government organizations, particularly community-based organizations, from New York City and Mumbai

On 16 June, about 20 workshop participants visited the Govandi municipal waste dumping grounds, which is source of air pollution, and where many children work as rag pickers. They also visited the adjacent slums where the children live, and talked to them and their parents and teachers, and to doctors.

The workshop was organized by Cerana Foundation and sponsored by the US Environmental Protection Agency. The following organizations co-sponsored the workshop: Indian Association of Air Pollution Control, Central Pollution Control Board, Andhra Pradesh Pollution Control Board, National Initiative for Asthma Management, Maharashtra Pollution Control Board, Kaivalyadhama, National Environmental Engineering Research Institute, U.S. Agency for International Development, New York University—Center for Immigration Health, New York City Asthma Partnership, Emory University—Rollins School of Public Health.

INTERNATIONAL WORKSHOP ON ENVIRONMENTAL HEALTH
CHILDREN'S ASTHMA
Mumbai, 14-15 June 2005

Workshop Agenda

14 June **Workshop day 1**
Venue: S P Jain Auditorium, Bombay Hospital, 12 New Marine Lines, Mumbai 400 020

8.30-9.30 **Registration & networking**

9.30-10.15 **Plenary session 1: Opening session**

Speaker : Sagar Dhara, *Cerana Foundation, Hyderabad,*
Welcome Address

Speaker : Maureen O'Neill, *US Environmental Protection Agency, New York*
Opening Remarks

Speaker : Angus T Simmons, *Consul General, US Consulate, Mumbai*
Opening Remarks

Speaker : D B Boralkar, *Maharashtra Pollution Control Board, Mumbai*
Opening Remarks
Four asthmatic children: First-person accounts

10.15-11.45 **Plenary session 2: Air pollution and its health impacts**

Chair: Ted MacDonald,
India Desk, Office of International Activities, US Environmental Protection Agency, Washington

Speaker : Sukumar Devotta, *National Environmental Engineering Research Institute, Nagpur.*
Health and air pollution of Mumbai: A perspective analysis

Speaker : D B Boralkar, *Maharashtra Pollution Control Board, Mumbai*
Air pollution management in Mumbai: Current and future strategies

Speaker : Louis Calcagno,*New York Department of Transport, New York*
New York City air quality and alternate fuels program

Speaker : Rohini Chowgule, *National Initiative for Asthma Management, Mumbai*
Mumbai and asthma

Discussion

11.45-13.15 **Plenary session 3: Responses to air pollution and its health impacts**

Chair: S R Kamat,
Retd Prof, Respiratory Medicine Department, KEM Hospital, Mumbai

Speaker : B Sengupta, *Central Pollution Control Board, Delhi.*
Regulatory response to air pollution in India

Speaker : Ramana Dhara, *Rollins School of Public Health, Emory University, Atlanta*
Asthma surveillance and intervention

Speaker : Vijay Kanhare, *Occupational Health and Safety Centre, Mumbai*
Community's perception of impediments to mitigating air

pollution-related health effects

Speaker : Ameesha Mehta-Sampath, *US Environment Protection Agency, New York.*
Addressing the Childhood Asthma Epidemic in New York City-A Mega-City

Discussion

13.15-14.00 Lunch

14.00-14.15 Briefing on how breakout sessions are to be conducted and their deliverables

14.15-15.15 Breakout session 1

Air quality management interventions: Gap analysis, identifying critical elements that, if put into place, can help reduce asthma incidence, what is required to put these elements into place and what are the impediments for putting them into place.

Facilitators: Paritosh Tyagi, Maureen O'Neill, S P Singal

Asthma management interventions: Gap analysis, identifying critical elements that if put into place can help reduce asthma incidence, what is required to put these elements into place and what are the impediments for putting them into place, who will put them into place, what cooperation is required from other agencies, timelines and costs for putting these elements into place.

Facilitators: Ameesha Mehta-Sampath, Ramana Dhara

Community interventions: Gap analysis, identifying critical elements that if put into place can help reduce asthma incidence, what is required to put these elements into place and what are the impediments for putting them into place, who will put them into place, what cooperation is required from other agencies, timelines and costs for putting these elements into place.

Facilitators: Sapna Pandya, S K Gupta

15.15-15.30 Tea

15.30-16.30 Breakout session 1 (contd)

16.30-17.30 Plenary session 4: Reporting and discussion on the breakout sessions

Chair: R Rajamani,
Former Secretary, Union Ministry of Environment & Forests, Hyderabad

15 June **Workshop day 2:**
Venue: S P Jain Auditorium, Bombay Hospital, 12 New Marine Lines, Mumbai 400 020

9.30-10.30 Plenary session 5: Asthma intervention programmes

Chair: T K Joshi,
Centre for Occupational and Environmental Medicine, Lok Manya Tilak Hospital, Delhi

Speaker : Sapna Pandya, *Centre for Immigrant Health, New York University School of Medicine, New York*
Lessons from South Asian community-based intervention programmes in New York City

Speaker : Rajesh Kotecha, *Chakrapani Ayurveda, Jaipur*
Use of ayurveda in asthma management

Speaker : Jacqueline Fox-Pascal, *New York Department of Health and Mental Hygiene*
Lessons from community-based asthma intervention in New York City

10.30-10.45 Tea

10.45-12.15 Plenary session 5 (contd):

Asthma intervention programmes

Chair: T K Joshi,
Centre for Occupational and Environmental Medicine, Lok Manya Tilak Hospital, Delhi

Speaker : D R Vaze, *Kaivalyadham*
Role of yoga in asthma management

Speaker : Kalpana Sharma, *The Hindu.*
Appraisal of the role of the media in awareness building regarding environmental issues

Speaker : Shyam Divan, *Practicing advocate*
How effective have the courts been in tackling air pollution and in providing relief to those affected by it?

Discussion

12.15-12.30 Recapitulation of outcome of Breakout session 1

Chair: R Rajamani,
Former Secretary, Union Ministry of Environment & Forests, Hyderabad

12.30-13.15 Lunch

13.15-15.00 Breakout session 2

Air quality management interventions: Prioritising the elements required to be put into place, who will put them into place, what co-operation is required from other agencies, timelines and costs for putting these elements into place, action plan.

Facilitators: Maureen O'Neill, S P Singal

Asthma management interventions: Prioritising the elements required to be put into place, who will put them into place, what co-operation is required from other agencies, timelines and costs for putting these elements into place, action plan.

Facilitators: Ameesha Mehta-Sampath, Ramana Dhara

Community interventions: Prioritising the elements required to be put into place, who will put them into place, what cooperation is required from other agencies, timelines and costs for putting these elements into place, action plan.

Facilitators: Sapna Pandya, S K Gupta

15.00-15.15 Tea

15 .15-16.30 Plenary session 6: Synthesizing the action agenda and closing session

Chair: R Rajamani,
Former Secretary, Union Ministry of Environment & Forests, Hyderabad

Report from breakout sessions, synthesis of recommendations made by each breakout session, integrated action plan.

Speaker : S K Gupta, *Indian Association for Air Pollution Control, Delhi.*
Closing remarks

Speaker : Ameesha Mehta-Sampath, *US Environment Protection Agency*
Closing remarks

Speaker : T Vijayendra, *Cerana Foundation*
Vote of thanks

16 June **Workshop Day 3: Site visit**

8.30 Start from West End Hotel

10.00-13.00 Bainganwadi and Shivajinagar slums, Gowandi

14.30 Return to West End Hotel

Plenary Session 1 : Opening Session

Sagar Dhara, *Director, Cerana Foundation, Hyderabad.*

Welcome Address

My greetings to the asthmatic children who have come here, and to all of you who have are so deeply concerned with the subject of this workshop. You have chosen to spend two precious days of your time to be with us, and many of you, I know, have come from great distances to be here with us today.

It gives me great pleasure to welcome you all to this International conference on environmental health—Children's asthma: Sharing community-based intervention and experiences and solutions between two mega cities: Mumbai and New York City.

Air pollution probably poses the biggest challenge to humankind today. It impacts the health of those living close to air pollution sources, it impacts environments quite far away from sources due to long range transport of air pollutants, and it has the potential to impact future generation because of global warming.

In this workshop we are concerned with only with the first issue, that is, health impacts of air-pollution. The first question that anyone interested in this subject will ask is how serious is the problem. WHO estimates that there are 300 million asthmatics in the world. In India, estimates indicate that air pollution-related deaths exceed 100,000 per annum and air pollution injuries are in the region of 25 million. These are large numbers, but they are only estimates. In Mumbai, probably every family has one person who suffers from air pollution related health effects.

To get a better grip on the problem, we will have to use better tools to get more accurate numbers of the injury burden that air pollution is causing and also use this as a yardstick to measure our performance of environmental management.

Of those who are affected by air pollution, children are the most vulnerable. So, while we may discuss the problem in its generality in this workshop, the focus is on children's asthma.

To tackle a problem as large as this, an extrordinary effort is required. Like in many other similar issues, we are beginning to learn that combining heads and hands is the best way to meet such challenges. This workshop has participants who are from many different walks of life—regulators, scientists, doctors and other health providers, community health workers, trade unions, NGOs, persons from the media and legal professions, and most importantly asthmatics. We hope that together we will move towards forming a network that will allow us to tackle this problem more effectively.

Once we accept that no single body or stakeholder can solve the problem on their own, logically we also must accept that we need to learn from each other's experiences. We are here to exchange views and experiences across continents—more specifically between Mumbai and New York City. I am confident that the exchange will be very fruitful.

Even when we started preparing for this workshop, one of the fundamental tenets that we implicitly accepted was that the risk bearer

is best positioned to tackle the risk that he or she face, as they are motivated to do this. What they lack is the wherewithal. Our responsibility is to help in acquiring the wherewithal to understand and tackle the misery that air pollution is causing.

Over the next two days there will be much discussion. Some may want to discuss very local issues such as how to reach relief for the asthmatic children we will be meeting in the Bainganwadi slums the day after tomorrow on our field trip. Others may want to discuss larger global issues such as the need for equity of carbon consumption and carbon emissions and its link to the problem of children's asthma. There is room for both levels of discussion in the large amount of time w have allocated to breakout sessions on the afternoon of both days. But if the workshop is to meet one of its central objectives of putting together an actionable plan to tackle air pollution and its health impacts, we will have to come up with a practical roadmap to do this. I am reminded of Dr Irving Selikoff's (the man who firmly linked cancer with asbestos exposures) advice to us 20 years ago when some of us were attempting to do epidemiological studies soon after the Bhopal gas tragedy. He wrote saying that there are many roads to the moon, but the one we needed to choose, given our limited resources, was the one that is the most practical. We need to keep his advice in mind while we discuss action plans this afternoon.

I must make special mention that this workshop has been possible because thirteen organizations came together to do it. It started with us at Cerana Foundation and the US Environmental Protection Agency. But soon, eleven other organizations joined us: The Indian Association for Air Pollution Control, Central Pollution Control Board, AP Pollution Control Board, National Initiative for Asthma Management, Maharashtra Pollution Control Board, Kaivalyadhama, National Environmental Engineering Research Institute, US Agency for International Development, Centre for Immigration Health, New York University, New York Asthma Partnership, Rollins School of Public Health, Emory University. Rarely have I seen so many organizations getting together to do a workshop. It is a good indicator of the seriousness with which we all view the problem. Thank you all for coming together to work in this workshop. This workshop would not have been possible without you.

Once again, I welcome you all to this workshop. I hope you enjoy your stay in Mumbai. Please do not hesitate to approach our volunteers for anything.

Thank you.

Maureen O'Neill, *Senior Policy Advisor, Environmental Protection Agency, New York.*

Opening Remarks

Why are we here?

We have a magnificent resource—our children—as well as a significant public health issue—asthma —in common. Our hope is that we can help each other help our children in New York and Mumbai by working innovatively and meaningfully together. In the United States, asthma is at an epidemic level. New York City has one of the highest rates in the nation, and it is particularly severe among low-income children. It is the biggest reason our children miss school.

What do we know?

- We know the lung is not well formed at birth and development of full functionality does not occur until about 6 years of age.
- We know kids breathe 50% more air than adults per kilogram of body weight.
- Early growth and development of the child suggests that there is a critical exposure time when air pollution may have lasting effect on respiratory health.

Ironically, it's not just young children we are talking about. It's the unborn. Prenatal exposures of air pollution are associated with early foetal loss, preterm delivery and lower birth rate.

Perhaps the most serious thing that can be done to a child's life is to end it. Recently, a number of studies have reported that air pollution is associated with precisely that.

What do we want to do?

We want to work on a threefold approach—public health, air pollution and community involvement. We know that asthma is a complicated and multi-factorial issue that needs a holistic approach. We want to know if there are some actions New York and Mumbai can take together that will help us work smarter and help even more children. We want to work as effectively and as holistically as possible.

Opportunities and action

We know we all have obstacles, but we clearly all have opportunities. This is one of them. We want to keep the prize—the children—the focus of this meeting and be sure that we focus on what we can do now and in the near future.

I'd like to close by reminding all of us of a great quote: "The purpose of life is to discover your gifts and the meaning of life comes from giving your gifts away."

So, let's act as if it is impossible to fail. First, think. Second, believe. Third, dream and finally, dare.

Let's get action on what we can do now and in the future to protect and enhance our most precious resource—our children.

Action Plans Prepared in Breakout Sessions

Methodology for Breakout Sessions

The sequential steps followed in preparing the action plan are given below:

Visioning: Individuals spelt out their vision of what specific improvements they wish to see in place in future for the issue they were dealing with. Vision ideas were then clubbed by major heads. Those ideas that did not fall into any major head were temporarily put into a "parking lot", to be dealt with later. Vision ideas were also classified as—short-term, medium-term and long-term.

Present status: In the next step, each group spelt out the present status of each issue.

Desired action: In the third step, each group worked out the action that is required to go from the present status to the vision they had spelt out.

Multi-voting: In the last step, vision ideas were ranked by a process of multi-voting.

Groups

Workshop participants were divided into three groups to prepare action plans. Trained persons facilitated the discussion in each group. Ground rules were followed for smooth functioning of the groups. The members of each group are listed below.

Air quality management intervention group

Facilitators: Paritosh Tyagi, Maureen O'Neill, S P Singal

Reporters: Naira D'Souza, Surabhi Haldipur

Members: Louis Calcagno, S Katoley, Vivek Monteiro, Bedoshruti Sadukhan, V Siva Sankar, Balakrishna Shetty, B Balagangadhar, Michael Fisher, Krithika Srinivasan, M Hota, Ted MacDonald, Amit Chauhan, S Nagabramhachary.

Asthma management intervention group

Facilitators: Ramana Dhara, Ameesha Mehta-Sampath

Reporters: Shonali Kundu, Sushant Raut

Members: Rohini Chowgule, D R Vaze, Riddhi Prakash Doshi, Mehjabin Rizvi, Leela Deshmukh, G K Pandey, Satish Sinha, K Lazrus, Cyril Fernandes, Sudhir Badami, Ravi Duggal, Sunita Nayak.

Community intervention group

Facilitators: Sapna Pandya, S K Gupta

Reporters: Anisha Kundu, Hazel D'Souza

Members: P Nandusekhar, Jacquiline Fox-Pascal, U C Mishra, Gautami A Pole, S K Mastan, S K Bhargava, Erin Inglish, Debi Goenka, R Rajamani, S M Melgiri, Sagar Dhara, P Prakash, A Qureshi.

Action plan

The action plans made by each group are given below. To avoid duplication between the plans prepared by the three groups, an odd point made by a particular group may either have been omitted or shifted to another group's plan.

Action plan 1: Air quality management

Action plan for the air quality management suggested interventions in the following areas: Planning air quality management, public participation, emission control, transport sector and technology shifts.

Air Quality Management : *Planning of air quality Management*

Present status	Action required	Vision
• Many pristine environments not identified, therefore unprotected	• Identify ecologically sensitive areas (ESAs), and notify them	• ESAs, eg, Western Ghats, identified and notified; pristine environments protected
• Areas of high risk associated with poor air quality inadequately identified	• Identify areas with high risk associated with poor air quality, do air quality monitoring, and establishing baseline datums • Assess risk posed by air quality in different areas • Action plan to reduce emissions and improve air quality include elements such as: o Re-zoning of areas to using GIS to reduce risk associated with poor air quality o Set up new licensing standards o Prohibit indiscriminate biomass burning o Establish new infrastructure for the transport sector o Move towards more eco-friendly transport systems and technologies, eg, bicycles and bicycle tracks o Carrying capacity of air sheds should be established before siting air polluting industries and sources o Provide financial help for cleaner technologies and fuels • Fix appropriate management strategies for each area • Monitor effectiveness of action plan	• Reduced risk in areas that previously had high risk associated with poor air quality • Greater emphasis put on preventing asthma than curing it
• Lack of integration between development planning and environmental protection • Over-dependence on command and control methods via the regulatory mechanisms	• Link project funding to environmental sustainability • Rely less on foreign funding • Use Indian funding for environmentally sustainable projects • Prepare & circulate paper on air pollution and health impacts • Draw action plan to make all air pollution policies and plans in consultation with public	• Urban planning and environmental protection are integrated • Strategic environmental planning emphasized over regulatory control

Air quality management: *Public participation*

Present status	Action required	Vision
• Limited awareness about environmental issues	• Include environmental education as part of school syllabus from lower classes • Have more field trips/workshops in environmental education • Create environmental awareness among adults through cultural programmes, workshops, banners, etc • Hold more drawing, painting, quiz competitions on environmental topics for kids • Do more "public rights-based" awareness programmes • Do follow-up programmes after doing awareness programmes	• Increased public (adults and children) awareness on environmental issues • Better public awareness of health implications of indoor and outdoor air pollution
• Public has limited rights to environmental information	• Increase number of air quality monitoring stations and publicize data from these stations • Public information cells must be created in pollution control boards and environmental ministries • Information on air pollution and its impacts should be given to gram panchayats (local self governments)	• Increased public participation in environmental management—as a right, and not as a favour
• Limited people's participation in environmental decision-making	• Citizen's groups to be formed, trained, and given government recognition to monitor air quality • Public participation in public hearing processes should be encouraged and strengthened • Community should be encouraged to participate along with government in efforts to reduce air pollution • Communities should be given control over natural resources • Communities should be encouraged to use their traditional knowledge systems in managing natural resources • Recommendations made in public hearings for facilities requiring environmental clearances should be mandatorily incorporated into the environmental clearance process • Popularize scientific awareness	• Greater public participation in environmental monitoring and management leading to better regulatory compliance and improve public access to information, eg, EIAs being in public domain • People are empowered to monitor air quality, eg, the use of the bucket method, and ensure compliance of environmental laws • Good public participation in public hearings help avoid dirty and hazardous projects • Local communities have total control over environmental regulatory decisions over industries and polluting sources in their areas, including refusal of permissions

Air quality management: *Emission control*

Present status	Action required	Vision
• Violators of environmental laws and regulations get away scot-free, or very lightly • Regulators remain largely unaccountable for present state	• Amend Indian Penal Code (IPC) laws to bring regulators and violators of environmental laws and regulations under the ambit of IPC • Provide for stiff penalties for polluting and fuel adulteration	•IPC used for non-compliance of environmental and environmental •Regulators become accountable to public
• Old high-emission technologies in use	• Assess technologies of proposed projects for emissions • Determine best available technology for all uses • Mandate that only best available technology is to be used • Continuous review of technologies for future application • Government-industry partnership provides assistance to high air polluting small-scale industry to help them comply with standards • Set quotas for air pollution emissions, including for individuals • Industrial licensing should prescribe strict time limits for plant and machinery, so that outdated technologies are phased out • Introduce strict licensing policies for backyard smelters and other small-scale polluting industries • Policy changes brought about to see shift from the use of polluting fuels—petrol, diesel, to cleaner fuels, eg, gas, bio-gas • Encourage the use of low-cost bio-diesel that has low NOx emissions (low O_3) as a carbon-neutral alternative to CNG • Reduce subsidy diesel and diesel-driven vehicles • Improve kitchen ventilation; where possible use exhaust fans	•Cleaner technologies and fuels used to reduce emissions
• Universal yardstick to measure progress made in emission control unavailable	• Develop dose-response equations to air pollutants • Monitor health of workers exposed to pollutants and maintain their health records	•Public health used as a tool for emission control
• High ground level emissions • Roadside soil gets re-entrained	• Green the city	•Biotic control methods for pollution control effectively used

Air quality management: *Transport sector*

Present status	Action required	Vision
• City roads congested and bad at places • High pollution levels caused by vehicular emissions • Inadequate public transport • Long lines for CNG acts as a deterrent to switch over from petrol/diesel	• Improve public transport, including mass transport systems, eg, railways, and encourage their use • Reduce the number of 2-wheelers • Provide segregated bicycle lanes and better footpaths • Do not build malls at crowded junctions • Educate vehicle owners on benefits of timely vehicle servicing • Encourage entry of fuel cell powered vehicles • Admix 10% ethanol in petrol • Make ultra-low sulphur diesel available to trucks and buses • Use of private vehicles may be restricted by law • Make financing of private vehicles difficult • Make toll amounts for single-occupancy cars higher	• Reduction in traffic congestion • Lowering of vehicular emissions

Air quality management: *Technology shifts*

Present status	Action required	Vision
• High emissions and high energy costs due to use of older technologies	• Educate industry and transport owners on new low-emission technologies and their power-saving benefits • Provide clean air technologies to small-scale industries, particularly to lead and zinc recyclers	• Lower emissions and fuel saving through technology shifts
• Supply-side management of dirty fuels causing a lot of pollution	• Provide financial assistance for making fuel shifts • Encourage use of renewable energy and cleaner cookstoves • Emphasize demand-side management through public awareness campaigns	• Shift in energy consumption patterns
• Dirty environments	• Encourage the use of eco-friendly products • Encourage the slogan—Reduce, reuse, recycle • Make eco-labelling of products mandatory • Make doing life-cycle analysis compulsory • Mandate branding products with energy & air pollution burden	• Cleaner environments

Multi-voting: In the multi-voting, the various sectoral interventions received the following votes, indicating their rank order of importance.

Public participation	52
Planning of air quality management :	49
Emission control	38
Technology interventions	21
Transport sector	7

Action plan 2: Asthma management

The action plan for asthma management suggested interventions in the following areas: Resource bank, networking, asthma surveillance, education and management, advocacy, education through media and research

Asthma management: ***Resource bank of health care providers, patients, NGOs, government and experts***

Present status	Action required					Vision
• No patient counselling centres	• Each asthma unit to be provided with a counsellor					• Asthma counselling centres established, including in schools and colleges
	Target	**Partners**	**Action steps**	**Timeline**	**Implementers**	
	• Asthma patients & families	• Hospital managements • Counsellors	• Contact asthma care units • Create required infrastructure	1-3 yrs	• Government • Hospital managements • Private health sector	
• No community volunteers working specifically for	• Involve and train community workers to work for asthma					• One asthma worker for every thousand population
	Target	**Partners**	**Action steps**	**Timeline**	**Implementers**	
	• Asthma patients & families	• NGOs • Government • Communities	• Train volunteers • Organize meetings • Monitor progress	1 yr	• Government • NGOs	

Asthma management: *Resource bank of health care providers, patients, NGOs, government and experts (contd)*

<table>
<tr><th>Present status</th><th colspan="5">Action required</th><th>Vision</th></tr>
<tr><td rowspan="3">• No known specialized asthma care units</td><td colspan="5">• Set up specialized asthma care unit in each tertiary care hospital</td><td rowspan="3">• Each hospital to have a special asthma unit with specialized counselling unit as have been set up for HIV/AIDS</td></tr>
<tr><td>Target</td><td>Partners</td><td>Action steps</td><td>Timeline</td><td>Implementers</td></tr>
<tr><td>• Asthma patients</td><td>• Government
• NGOs
• Medical Practitioners
• Medical Colleges</td><td>• Put forth proposal for setting up unit
• Arrange funds (private & public)
• Arrange health care staff for unit
• Publicise unit</td><td>1-3 yrs</td><td>• Government
• Hospital managements
• Private health sector</td></tr>
<tr><td rowspan="3">• No networking among health service providers</td><td colspan="5">• Set up a platform for health service providers to interact</td><td rowspan="3">• Existence of networks of health care providers, hospitals and laboratories tracking each
childhood asthma case till treated successfully</td></tr>
<tr><td>Target</td><td>Partners</td><td>Action steps</td><td>Timeline</td><td>Implementers</td></tr>
<tr><td>• Health care providers
• Research personnel
• Experts</td><td>• Health care providers
• NGOs</td><td>• Initiate contact with professionals
• Arrange monthly meets
• Starts an asthma journal</td><td>6 months- 1yr</td><td>• NGOs</td></tr>
<tr><td rowspan="3">• No support group for patients</td><td colspan="5">• Set up a support group for patients</td><td rowspan="3">• Patient network in existence</td></tr>
<tr><td>Target</td><td>Partners</td><td>Action steps</td><td>Timeline</td><td>Implementers</td></tr>
<tr><td>• Patient & families</td><td>• NGOs
• Patient & families
• Health care professionals</td><td>• Contact patients & families
• Form support groups
• Publicize</td><td>6 months- 1yr</td><td>• NGOs
• Community volunteers</td></tr>
</table>

Asthma management: *Partnering and networking—Asthma coalition/consortium*

Present status	Action required					Vision
• No asthma coalition exists in Mumbai • Exposure measurement infrastructure weak • Public health programmes poorly funded • Programmes for preventing asthma lacking	• Take steps to form an asthma coalition					• International networking among NGOs • National committee to address asthma at national level by the end of the fifth year • More government funds and aid are allocated for asthma control • Day care centres are created for all strata of society • Youth are involved with the issue
	Target	**Partners**	**Action steps**	**Timeline**	**Implementers**	
	• Patients & families • NGOs • Hospitals • Community volunteers & workers	• Local officials • Donors • Media • Associations	• Take the aid of existing partners to form a committee • Identify key partners • Organize local meets • Set up communication between patients & workers • Discuss preventive measures •Hold regional (dist, state-level) & national meeting	**1 yr**: local meeting **2 yrs:** regional meeting **3 yrs:** forming national coalition **5 yrs:** committees function properly	• Cerana Foundation may take the initiative, others will follow	

Asthma management: *Surveillance system*

Present status	Action required					Vision
• No systematic surveillance currently in place. Some surveillance may exist in pockets	• Develop a comprehensive surveillance system that provides information on incidence and prevalence of asthma in Mumbai					• Better surveillance of asthma • Decreased incidence of asthma amongst children • Increased awareness about asthma
	Target	**Partners**	**Action steps**	**Timeline**	**Implementers**	
	• Patients • Policy makers • Health care providers • Communities	• Health Dept • Municipal Corporation • Hospitals • Paramedics • Medical colleges	• Identify coordinating agency • Record data • Coordinating agency to collect, analyze, distribute data • Set up website	1-3 yrs	• Mumbai Municipal Corporation	

Asthma management: *Education and management*

Present status	Action required	Vision
• Preliminary steps being taken by physicians to educate patients and their families	• Holding regular workshops for general practitioners (physicians) for early diagnosis of asthma • Holding workshops for patients for them to understand their disease • Teaching about asthma in community medicine courses • Holistic approach developed towards asthma • Holding regular classes for parents of asthmatic children on recognizing asthma and its links to the environment	• High public awareness about asthma • Asthma management experts would have reached interior parts of the country • Develop an understanding of cultural differences between communities

Target	Partners	Action steps	Timeline	Implementers
• Patients • Families • Communities • Schools	• Specialists • Associations • Media • Community groups • Clubs • Institutes—yoga, ayurved	• Doing continuing medical education (CME) for physicians • Publishing and distributing literature in hospitals, schools • Developing a website	1-3 yrs	• Medical associations • Health Department

Asthma management: *Advocacy*

Present status	Action required	Vision
• Government not yet focussed on asthma, hence no pro-active government policy • Not all stakeholders are yet involved with this issue • Though air quality has improved, more needs to be done to improve it	• Public campaigns are conducted to achieve desired end-goals	• Government focuses attention on asthma and commits funds • Government becomes pro-active in developing policies, legislation, regulation for a cleaner and pollution-free indoor and outdoor environments • There is an increased involvement of all stakeholders in this issue

Asthma management: *Education through media*

Present status	Action required	Vision
• Asthma related issues has no exposure in media	• Use media for educating public about asthma and reach deprived groups	• High public awareness about asthma • Asthma management experts would have reached interior parts of the country

Asthma management: *Research*

Present status	Action required	Vision
• Limited research and studies being done	• Encourage studies on asthma and provide the wherewithal for this	• Nutritional aspects of asthma management are better understood • Research on the genetic basis of asthma being done • Preventive measures for asthma attacks are better developed

Multi-voting: In the multi-voting, the various sectoral interventions received the following votes, indicating their rank order of importance.

Education and management	29
Networking	21
Asthma surveillance	19
Resource bank	16
Research	16
Education through media	9
Advocacy	7

Action plan 3: Community intervention

The action plan for the community suggested interventions in the following areas: Education and awareness, collective action/community empowerment, government accountability and changing value systems (enlightenment).

Community intervention: *Education and awareness*

Present status	Action required	Vision
• Lack of community educators for asthma • Myths, misconceptions, ignorance about asthma abound • Environmental education not part of school education • Access to asthma management centres poor • Asthma triggers in the workplace accepted as holding job is more important • Low awareness of asthma issues • Awareness of asthma lower amongst the poor as their education levels are low • Information on impact of pollutants inaccessible • Environment has been included in NCERT books, but not all children use these books • Some cultural factors are impediments for asthmatics to discuss their problem	• Observe communities at risk and their environments, including cause-effect relationships between asthma and air pollution • Take stock of existing knowledge and expertise, educational and medical resources • Develop relationship with communities • Eco-clubs, self-help, youth and women's groups should be used as mediums for education on asthma • Use existing science & environmental awareness programmes to spread awareness about asthma protection • Develop educational material and plans for its dissemination • Introduce yoga classes in communities • Prepare workbooks to help asthmatics understand the risk they face and take steps to protect themselves • Intervention areas—Govandi slums, Chembur, Western and Eastern highways • Assess/evaluate progress & modify it as required	• Current community workers trained to work as asthma workers • Increased asthma awareness in community, including slums and rural areas, through campaigns • Cause-effect relationship between asthma and air pollution is well understood by public • Yoga used in asthma management • Workbooks available to help asthmatics understand the risk they face and take steps to protect themselves • Improved data collection and dissemination

Community intervention—*Government accountability*

Present status	Action required	Vision
• Carbon users are not paying for the pollution they cause • Government departments function in isolation and in an uncoordinated manner • Government departments pass-the-buck, indulge in blame-games, have high inertia • Government policy is currently against community interests • Communities do not have the space to participate in policy formulation • Local communities are not taking adequate responsibility to make government accountable • Individuals in India and the US are not accountable for their daily actions—actions that add up and immensely contribute to environmental degradation—energy consumption, solid waste generation, toxic chemicals release, aerosol propellants, tobacco smoke, etc	•In line with the "polluters pays" principle, policy changes should be brought about to make carbon users (conspicuous consumers) compensate carbon victims (air pollution sufferers) •Regulators should be made to implement what they say in public •Local administrators should be appointed to decentralize government functioning •Local communities should be empowered to draw up local environmental management plans •As sense of ownership of action plan increases, communities should be encouraged to demand that government become more accountable	• Government becomes more accountable for its actions and sensitive to the needs of communities • Government departments work in coordination • Polluters become accountable for the pollution they cause

Community intervention—*Changing value systems*

Present status	Action required	Vision
• People lack concern for others • People keep their homes clean but do not mind polluting neighbourhood • Gap between allopathy and alternate holistic treatment	•Changing value systems is very difficult, but must be done through example and gentle persuasion •Attempts are made to have "Right to life", enshrined in the Indian Constitution as a fundamental right, re-interpreted to mean "Right to know risks being faced"	• Global outlook starts shifting from "gain maximization for a few" to "risk minimization for all"

Community intervention—*Collective action/community empowerment*

Present status	Action required	Vision
• Inadequate networking amongst NGOs for taking up community intervention programmes for asthma mitigation • Communities are not empowered to act on this issue • Geographical areas where communities at risk reside makes their empowerment difficult • The politicization of issues in communities poses a barrier for taking up this issue • Asthma patients are not empowered to deal with issue—they do not know their options	• Take steps to make risk-bearers the centre of risk mitigation programme and involve them in investigation programmes • Networking amongst stakeholders to be improved • Create local action groups, self-help groups • Set up a peer counselling system • Discuss environmental issues, including hazards and their solutions in such groups, eg, regarding vehicular emissions, public transport, indoor air quality, ventilation, etc • Public policy issues arising as demands from community discussions need to be articulated to authorities, eg, improvement in public transport system, etc • Local communities should be empowered to participate in making environmental management plans • Government should be asked to take up programmes for asthma mitigation on an emergency basis • Popularize car sharing	• Risk bearer become the centre of risk mitigation programmes • Sufferers, community-based groups, women's groups, form community-level planning and implementing bodies and are involved in decision making • Every ward has a community-based group to report on industry and vehicular emissions • Clubs involved in doing community -based work, including doing surveys, checkups

Multi-voting: In the multi-voting, the various sectoral interventions received the following votes, indicating their rank order of importance.

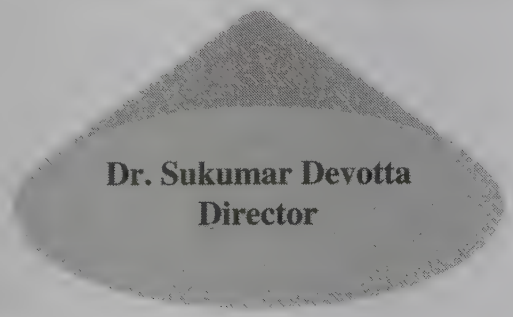
Education and awareness	37.5
Collective action	24.5
Government accountability	24.5
Changing value systems	8.5

Plenary Session 2 :
Air Pollution and Its Health Impacts

Chair : Ted MacDonald
India Desk, Office of International Activities
Environment Protection Agency
Washington DC

Speaker : Sukumar Devotta, *Director, National Environmental Engineering Research Institute, Nagpur* — Health and Air Quality of Mumbai: A Perspective Analysis

Health and Air Quality of Mumbai: A Perspective Analysis



National Environmental Engineering Research Institute
NEERI, Nehru Marg, Nagpur – 440 020
URL : www.neeri.res.in Email : dirneeri_ngp@neeri.res.in

What is Air Pollution?

Childhood and our primary education told us mainly about

AIR: Nitrogen (N_2), Oxygen (O_2), Carbon Dioxide (CO_2) and Water Vapour.

We added pollutants and later addressed them as Conventional Pollutants :

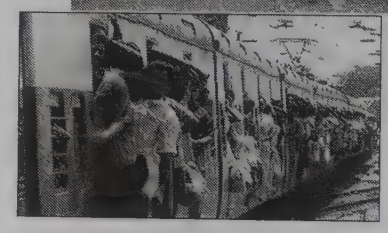
SO2, CO, NOx, SPM

Unconventional/Emerging Air Pollutants

- RSPM (PM-10)
- PM 2.5 (Fine and Coarse)
- Lead
- Ozone
- HC (general term)
- VOCs (BTX)
- Others

Characteristics of the Mumbai Region

- Diversity in culture, society, etc.
- Poverty
- High Population Growth
- Rapid and Ad-hoc Development
- High Rate of Urbanization



Classifications of Unseen Devils

- Physical : Dust
- Chemical: Solvents
- Biological: Spores/Viruses
- Others: Heat ??

Six Major Categories of Ill Health (IAQ)

- Acute respiratory infections in young children
- Adverse outcomes of pregnancy (low birth weight, stillbirth etc.)
- Lung cancer
- Chronic lung ailments/heart disorders
- Diseases of the eye
- Increase in severity of coronary heart disease

Other Associated Problems

1. High correlation with blindness and changes in immune system
2. 18% blindness in India is attributed to use of biomass fuels
3. About 4-6% of Indian national burden of disease is due to indoor air pollution

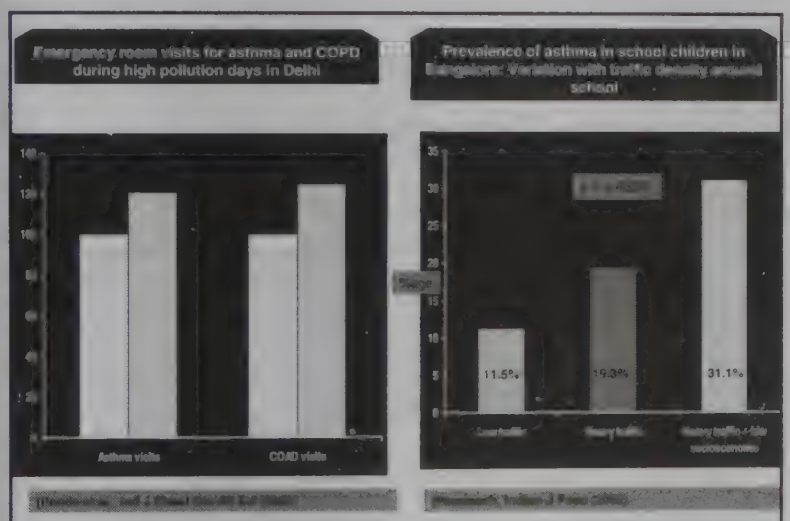
Did You Know??

- In Mumbai Asthma prevalence was about 3.5% by physician diagnosis and about 17% as per broad definition (including asymptomatic bronchial hyperactivity),

  Chowgule et al., Am.J.Respir Crit Care Med (1998)
- A study carried out in 1996 indicated that 373,00 deaths occurred due to indoor air pollution compared to 70,000 due to outdoor air pollution: (5 times higher incidences in indoor air pollution)

  Source: http://www.panasia.org.sg
- Almost half a million children under the age of five die each year from indoor air pollution in India

  Source: http://www.econotimes.com


Emergency room visits for asthma and COPD during high pollution days in Delhi
Prevalence of asthma in school children in Bangalore: Variation with traffic density around school
Asthma visits
COAD visits
11.5%
19.3%
31.1%

Sources and Major Pollutants for IAQ

Off-gas Building Material

- Building material emit large amount of fumes and pollutants such as heavy metals, VOCs, Radon etc.
- Stones, granite, aggregates etc. could be source for Radon gas
- Paints are major source of heavy metals
- Carpets may be for VOCs

Construction Material Pollutants

- Materials containing binders: Fiberglass insulation, clipboard, plywood and particle board
- Materials made from petrochemicals: Foam insulation, gaskets, furniture padding, carpet pads, softer plastics
- Paints and Coatings: Oils and solvents
- Others: PVC glues, vinyl adhesives and related solvents

Volatile Organic Chemicals

- Large varieties of VOCs in our home atmosphere
  - Cleaning Compounds
  - Solvents, Paints
  - Cosmetics
  - Fungicides, Insecticides
  - Disinfectants,
  - Deodorizers, Aerosol Sprays
  - Shoe Polish, Carpet Waxes etc.
  - Dry Clean Clothes
  - Tobacco Smoke

Asbestos And Mineral Fibres

- Commonly used in building construction for insulation and as forcing agent in cement, brake linings and plastics
- Also in older homes: in pipes, furnace insulation, mill board, textured paints, coating materials and tiles
- Old house renovation/ removal may bring these fibres into the indoor atmosphere

Electromechanical Equipment and Appliances

- Electrical gadgets like lights, buzzers, flashes and beepers produce organic particles
- Organic particles are also generated by the electro-magnetic field, particularly electrostatic air cleaners, copying machines etc.

Biological Contaminants

These are moulds, mildew, spores, microbes, pet dandruffs

These are also living oraganism that include bacteria, viruses, animal dander, dust mites, pollens etc.

These result from inadequate maintenance and housekeeping, water spills and excessive humidity in the building

Combustion Sources

- Furnaces, Fireplaces, Cigarettes, Cooking
- Depending upon the fuel type and additives, combustion may also result in emission of metals, sulphur oxides and fine particles
- Cooking ranges can increase NO_2 concentrations indoors
- Cigarette smoke contains more than 4000 substances, more than 40 of which are known carcinogenic agents

Micro-environment: Driving the Health Linkage

Issue of Indoor & Outdoor Air Pollution

- People spend 70-80% of time in indoors
- Susceptible population group (elderly, children, women, sick) exposed more
- Indoor concentration many times higher than outdoor
- May have toxic species (Indoor VOCs)

Air Pollution and Child Health

Time – series studies of daily mortality in developing countries (Mexico, Thailand, and Brazil) have documented associations between short-term exposures to particulate pollution and daily mortality from all causes or acute respiratory infections in children less than five years of age

Romieu et al. 2002; Cohen et al. 2004.

Initial Results:

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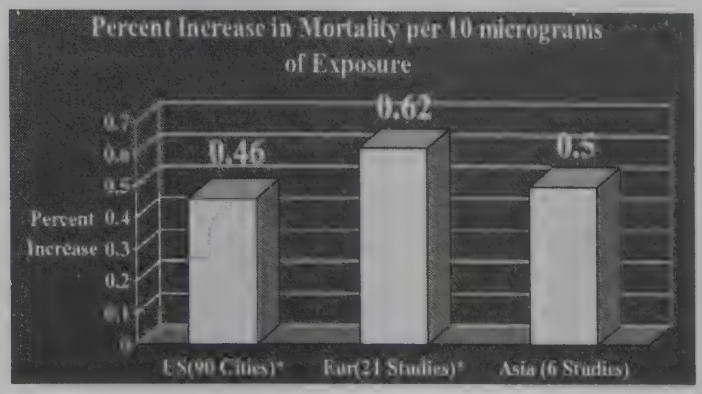
Asian Risk Estimates Similar to West



*Estimates Using Limited information Availability Revision based on HEI Meta Analysis

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Few Findings of Meta-Analysis of Asian Time-series Studies

- Most of the Mega-Cities have conducted some studies, though may not be a comprehensive one
- Daily mortality associated with PM
  - 5% increase per 10 micrograms/cubic meter of PM_{10}
  - Similar findings from some gaseous pollutants (e.g. SO_2)
- Increase in daily mortality for PM_{10} similar to Western studies using comparable methods

Changes in Air Quality

- We have seen some results of air quality which are encouraging.
- Why some of these changes have been seen?

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Indicators of Change

INDUSTRIES

- Large scale closure of industries in the city
- About 187 air polluting industries left
- Use of cleaner fuel (CNG and low S fuel)
- Better compliance
- Industrial Response: Reactive to Proactive !
- Concern about small/ unauthorized industries (data/information problem)

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Indicators of Change

Area Sources

- Domestic burning : Better and Cleaner (LPG/PNG)
- Bakeries/Crematoria/Incinerators: Poor control
- Refuse Burning: Large Scale: distributed sources
- Construction practices: Poor practices
- Resuspension Dust
- Road-side burning
- Leaf/ refuse burning for fuel
- Solid waste: not collected
- Evaporative Emissions
- Others

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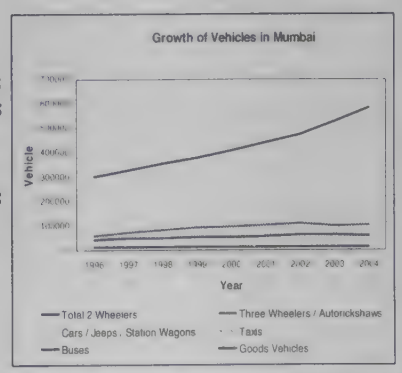
Indicators of Change

Transport Sector

- Vehicle on the road multiplied many fold
- Fuel has become cleaner: 500 ppm S, low aromatics etc.
- Alternative fuel: CNG/LPG for Taxis/Autos and buses
- New technology vehicles
- Average age of vehicles: 3-4 years



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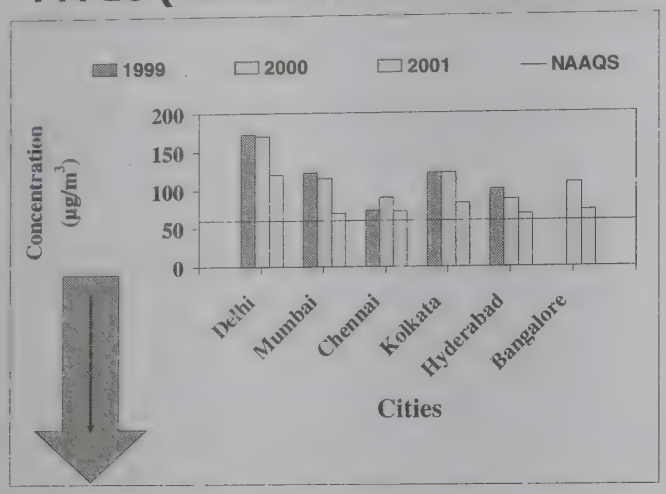
PM 10 (RESIDENTIAL AREAS)



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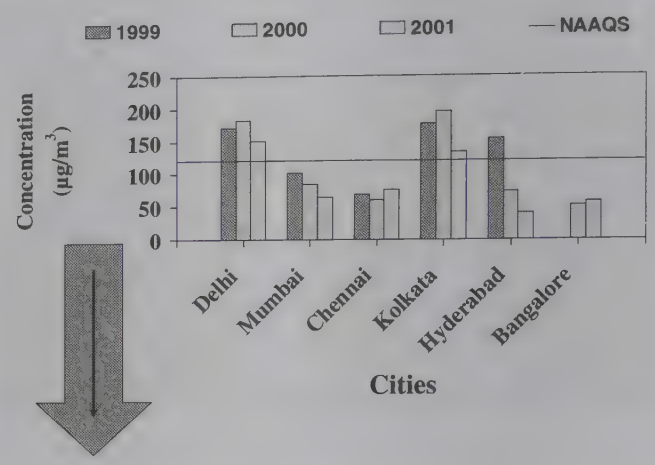
PM 10 (INDUSTRIAL AREAS)



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Major Intervention and Policy Changes took place in following areas:

- Fuel Quality
- Fuel Change
- Emission standards (Bharat I,II,III)
- Industrial policy
- Industrial Fuel Quality
- Domestic Fuel Quality (LPG/PNG)
- Availability/ nonavailabaility of electricity ?

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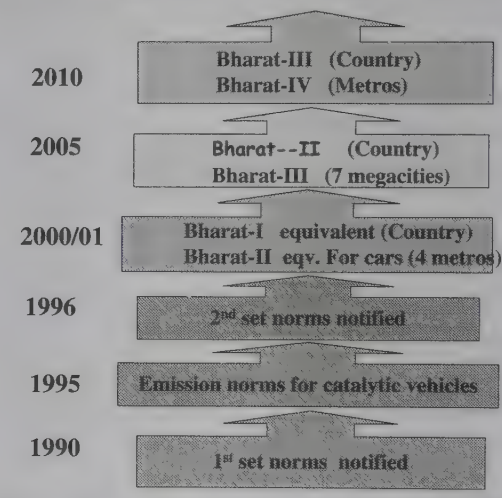
Vehicle Emission Norm Schedule In India



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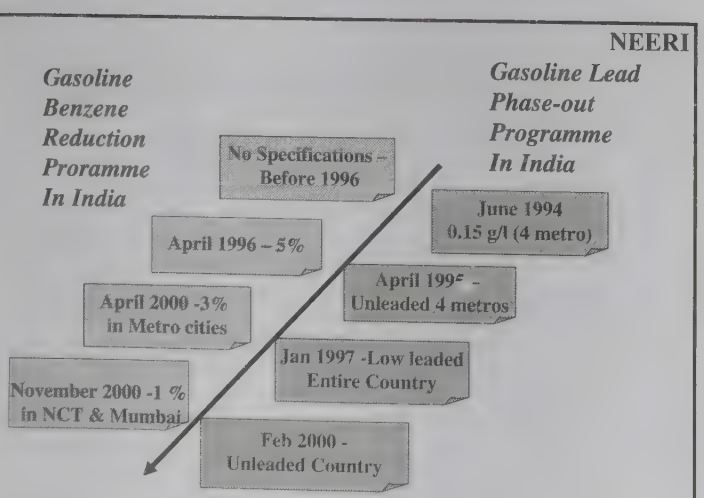
Gasoline Benzene Reduction Proramme In India
Gasoline Lead Phase-out Programme In India
No Specifications – Before 1996
June 1994 0.15 g/l (4 metro)
April 1996 – 5%
April 199? – Unleaded 4 metros
April 2000 -3% in Metro cities
Jan 1997 -Low leaded Entire Country
November 2000 -1 % in NCT & Mumbai
Feb 2000 - Unleaded Country

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Diesel Sulphur Reduction Programme In India

April 1996 -	-Sulphur 0.50 % 4 metros & Taj
April 1997 -	- Sulphur 0.25% Delhi & Taj
April 1998 -	- Sulphur 0.25% Metro cities
Jan 2000 -	- Sulphur 0.25% Entire Country
Jan 2001 -	- Sulphur 0.05% Mumbai
Jun 2001 -	- Sulphur 0.05% NCR
July 2001 -	- Sulphur 0.05% Chennai & Kolkatta

Indicators also have Problem Areas !!

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Problem areas

- Congestion increased (speed of 5 km/hr)
- Public Transport facilities inadequate
- Incentives for personal mode of transport
- Resuspended dust
- Refuse Burning
- Unauthorized industries

he benefits of reduced air pollution levels may not be sustainab

To Address Many of These Issues What We Should Do?

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- Understand The Sources and their Contribution
- Health Risk Assessment
- What Will Be Beneficial
- Take Actions For Better Air Quality Goals
- Do Source Apportionment
- Use Modelling tools
- Carry out benefit assess. of past and future actions
- Act based on good credible information

What Can We Do?

Indoor air can be kept clean or the concentrations can be reduced

- Ventilation is the best key, particularly the cooking area in a house
- Offices need ventilation and clean-up alongwith regular checks for humidity/dampness/leakages/ storages
- Avoid using chemical pesticides/insecticides indoors when people at home
- Avoid using chemical cleaning agents: use of neem oil

What Can We Do?

- Replace room freshners/ deodorizers with baking soda which is a good adsorbent of odours in the refrigerators
- Grow plants in and around as they are effective in removing toxic vapours and keeping the premises fresh

What we can do for outdoors

- Industries: better fuel, efficient processes, low raw material requirement (other sustainability principles)
- Vehicular : better fuel, engines, traffic, congestion etc.
- Area sources: cleaner fuel, better combustions, minimization of unregulated burning

We need to go back to Sustainable Development

- Development without adversely affecting the ability to develop of future generations: Planet can support indefinitely
- Organizations may ask whether they are part of the solutions to social and environmental problems or part of the problems!

Conclusions

- We are in a complex society with complex problems
- Air quality linkages with health needs better understanding to derive interventions
- Inter linkages with other environmental media should not be ignored.

THANKS FOR YOUR ATTENTION

Speaker : D B Boralkar, *Member Secretary, Maharashtra Pollution Control Board, Mumbai* — Air quality management in Mumbai: Current and future strategies

PRESENTATION ON

Air Quality management in Mumbai

current and future strategies

at

INTERNATIONAL WORKSHOP ON ENVIRONMENTAL HEALTH-CHILDREN'S ASTHMA

By

Dr.D.B.Boralkar

Member Secretary

MAHARASHTRA POLLUTION CONTROL BOARD
KALPATARU POINT, SION (E), MUMBAI-22

JUNE 2005

Clean air is the first immediate need for any human being to live.

It has the highest value to the user who wishes to survive, as clean air is the only way of receiving oxygen for respiration by human beings.

Desirably it would be the most precious natural resource, listed at the top of the priority list of natural resource to be conserved by us.

Most ironically however it is the most neglected and sometimes most obviously overlooked by many of us.

Genesis Of Air (P.&C.P.) Act

- India participated in UN Conference on Human Environment at Stockholm in 1972
- A decision was taken to take appropriate steps for the preservation of natural resources.
- This included the preservation of quality of Air and control of Air pollution.

Some major Air Pollutants, their sources and related health hazards

Pollutants	Source	Effects on human health
Carbon Monoxide	Incomplete fuel combustion (e.g. two-stroke engine)	Fatal in large doses; aggravates heart disorders; effects central nervous system; impairs oxygen carrying capacity of blood
Sulphur Dioxide	Burning of Sulphur containing fuel like coal in power plants and oil by vehicles	Affects the functions of lungs
Suspended Particulate matter	Smoke from domestic, industrial and vehicular sources	Small particles are poisonous. They are carriers of carcinogenic tracer elements
Nitrogen oxides	Fuel combustion in motor vehicles, power stations and furnaces	Affects respiratory system, irritation of respiratory tract
Volatile hydrocarbons	Partial combustion of carbonaceous fuels (two stroke engines, industrial processes, disposal of solid wastes)	Drowsiness, eye irritation, coughing
Oxidants and ozone	Emissions from motor vehicles, photochemical reactions of nitrogen oxides and reactive hydrocarbons	Causes increased sensitivity to infections, lung diseases, irritation in eyes, nose and throat, risk asthmatics, children and those involved in heavy exercises
Lead	Emissions from motor vehicles	Nervous system slow down and brain development is retarded.
Aldehydes	Chemicals	Irritation of eyes, nose, throat, sneezing, coughing, nausea, breathing difficulties, carcinogenic in animals.

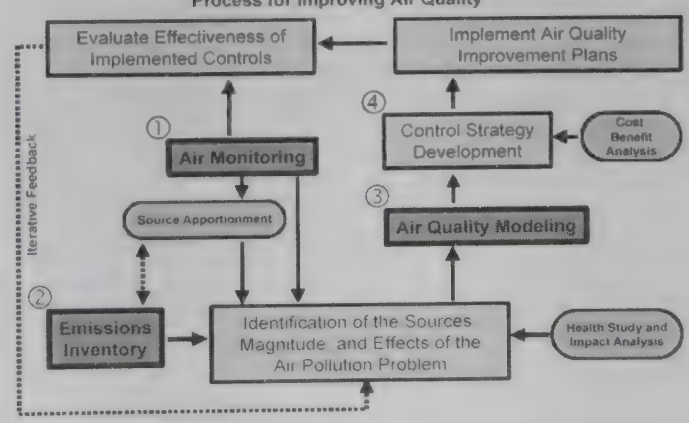
Source: compendium of Environmental Statistics, 1998 and 1999

The urban air quality management project based on 4 key factors

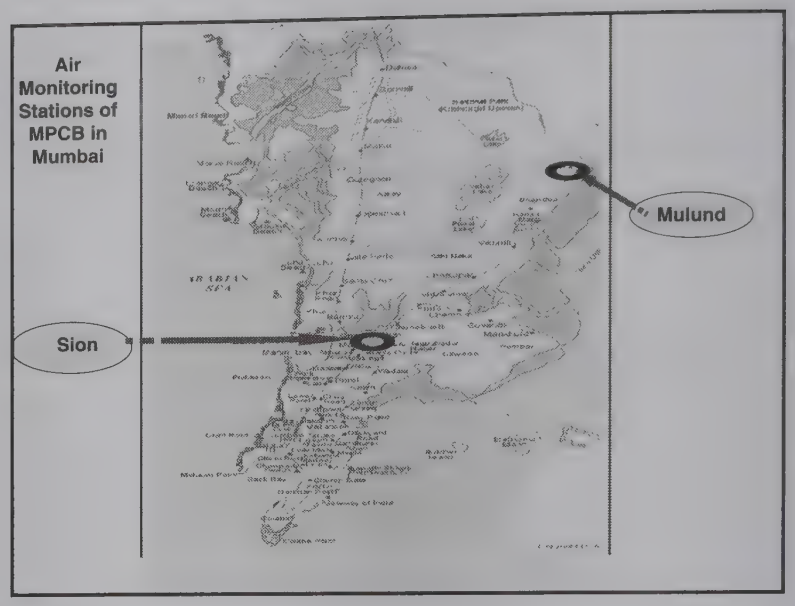
- Air Quality Monitoring
- Emissions Inventories
- Air Quality Modeling
- Control Strategy Development

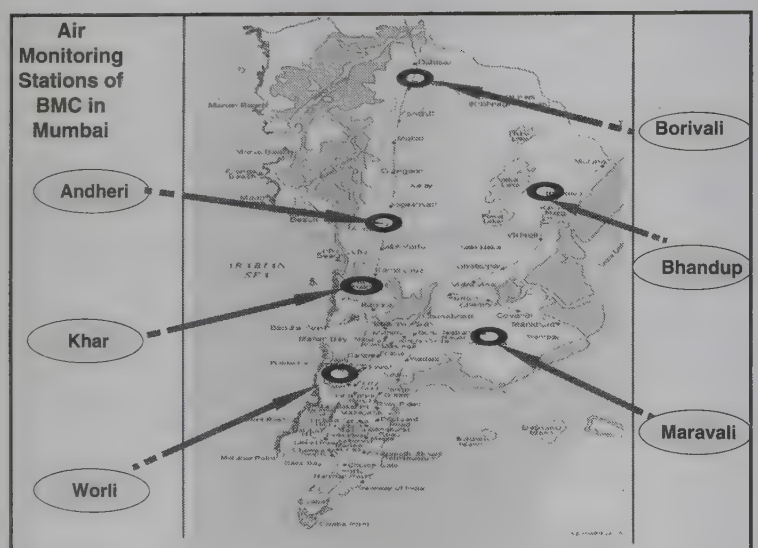
Air quality assessment and action plan development

Process for Improving Air Quality



Current Status of Air Quality in Mumbai





Ambient Air Quality at Traffic Junctions in Mumbai City

		Parameter (in µg/m³)		
Stations	Year	SO_2	NOx	PM10
Sion	2000-01	30.70	556.57	136.27
	2001-02	38.75	419.07	145.05
	2002-03	9.71	140.89	235.14
	2003-04	11.38	102.84	333.97
Mulund	2000-01	36.79	117.66	86.40
	2001-02	19.17	97.47	131.91
	2002-03	10.94	75.37	109.22
	2003-04	13.45	45.30	139.55

Ambient Air Quality at Traffic Junctions in Mumbai City

		Parameter (in µg/m³)				
Sites	Year	SO_2	NOx	NH3	SPM	LEAD
Worli	2001-02	25	31	73	166	0.13
	2002-03	36	43	44	184	0.13
	2003-04	23	33	41	170	0.14
Khar	2001-02	18	52	84	282	0.19
	2002-03	22	82	57	276	0.19
	2003-04	23	96	75	392	0.34
Andheri	2001-02	14	31	65	214	0.13
	2002-03	26	55	45	240	0.15
	2003-04	--	--	--	--	--

Source: Environment Status Report, Brihanmumbai, 2003-2004

Ambient Air Quality at Traffic Junctions in Mumbai City

		Parameter (in µg/m³)				
Sites	Year	SO_2	NOx	NH3	SPM	LEAD
Bhandup	2001-02	16	26	55	187	0.17
	2002-03	29	45	37	216	0.17
	2003-04	24	39	40	233	0.10
Borivali	2001-02	7	16	39	120	0.09
	2002-03	14	24	42	172	0.06
	2003-04	23	28	41	128	0.08
Maravali	2001-02	24	57	337	390	0.24
	2002-03	40	96	264	463	0.25
	2003-04	36	70	219	381	0.22

Source: Environment Status Report, Brihanmumbai, 2003-2004

Emission Load of Mumbai city (Tonnes/day) in the year 2003-04

Sr. No	Sources	SO2	PM10	NOx	CO	HC	Total
1	Domestic	3.57	10.77	4.22	108.36	17.56	197.5
2	Industrial	49.67	7.96	0.04	--	5.98	63.7
3	Refuse burning	0.11	1.37	0.25	5.42	1.92	9.1
4	Transportation						
a.	Transport (Diesel)	8.71	3.48	50.02	26.46	10.25	98.9
b.	Transport (Petrol)	0.65	--	19.34	296.05	43.98	360.0
	Total	62.71	23.58	73.88	436.29	132.69	729.1

Source: Environment Status Report, Brihanmumbai, 2003-2004

Ambient Air Quality in the month of January 2005 at Traffic junctions at Sion & Mulund

Parameter	SION		
	2003	2004	2005
SO_2	10	14	20
NOx	155	139	93
RSPM	397	305	181

Parameter	Mulund		
	2003	2004	2005
SO_2	14	12.6	15.5
NOx	70	63	62
RSPM	187	131	104

Population

The GMR is one of the largest metropolis of the world with its population of 99,25,891 in 1991, approximately 12 million with a population density of 19,758 persons per square km in 2001 to estimated 23,710 per square km in 2011(NEERI 2004). With increase in population there has been and will be increased number of vehicles and industrial activity aggravating air pollution.

Industry Location Policy

- Notification of 1984, the MMRDA was segmented into three zones:
  - Zone I - Municipal Corporations of Mumbai, Thane, Mira Bhayander etc.
  - Zone II – Municipal Corporation of Kalyan – Dombivali, Navi-Mumbai etc
  - Remaining Areas
- Modified Industrial Local policy for MMRDA 1993, the Industries have been classified as:
  - Schedule I – Non- polluting High Technology Industries.
  - Schedule II – Highly polluting Hazardous Waste Generating Industries.

MMRDA Location Policy, only non- polluting high technology Industries are allowed in the MCGM area

This has helped in reduction of polluting Industries in Mumbai.

Resultant reduction in Air pollution in Mumbai.

Policy Initiatives & Impacts

- Ban on use of coal in Mumbai- 1977 (+)
- Closure/ shifting of Industries in Mumbai (+)
- Closure of Cotton Mills – 1982 (+)
- Construction Activity (-)
- Burning of MSW and other residues (-)
- Indoor Pollution (-)
- Unorganized/ Cooperative industrial activities (-)
- Dhobi ghat -sensitive receptor (-)

Strategies for control Air Pollution in Mumbai

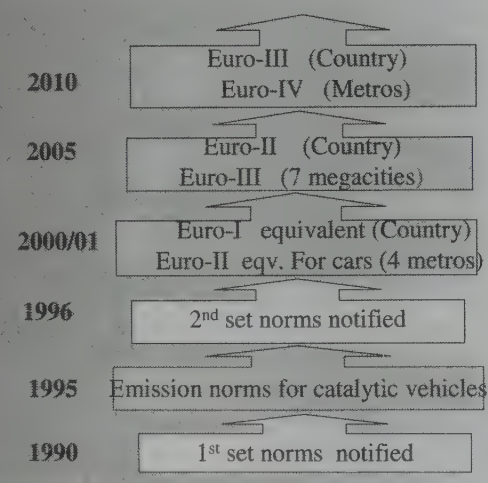
Urban Planning Policy

- Urban planning has four primary objectives
- To promote efficient provision of urban infrastructure and allocation of land use, there by contributing to economic growth
- To manage spatial extension while minimizing infrastructure cost
- To maintain or improve the quality of the urban environment
- To preserve the natural environment immediately outside the urban area

Fuel issues

- **Supply of cleaner fuel**
  - Petrol with 1% Benzene and Diesel with 0.05 % Sulphur is made available from 1.1.2001
- **Reduction in Sulphur**
- **Alternate fuel CNG/LPG**
  - CNG is made available at present in 99 outlets
  - LPG is made available at present in 99 outlets
  - CNG and LPG kits are available as on 31.12.2004
- **Fuel Adulteration**

VEHICLE EMISSION NORM SCHEDULE IN INDIA



Diesel Sulphur Reduction Programme In India

April 1996 -	-Sulphur 0.50 % 4 metros & Taj
April 1997 -	Sulphur 0.25% Delhi & Taj
April 1998	- Sulphur 0.25% Metro cities
Jan 2000 -	- Sulphur 0.25% Entire Country
Jan 2001	- Sulphur 0.05% Mumbai
Jun 2001 -	- Sulphur 0.05% NCR
July 2001 -	- Sulphur 0.05% Chennai & Kolkatta

Vehicular Technologies

- 4 stroke engines for all two and three wheelers
- Conversion of Diesel vehicles to CNG/LPG
- Replacement of Diesel vehicles by CNG/LPG
- Retrofitment of catalytic converter and Diesel Oxidation Catalyst for older vehicles
- Phasing out the older vehicles

In-use Vehicles Inspection and Maintenance

- Up gradation of existing PUC checking centers
- Fitness certification
- Use of 4 gas and smoke analyzer systems
- Inspection and identification of grossly polluting vehicles
- Infrastructure improvement and augmentation of manpower for I & M

Roads and Traffic Control

- **Improvement of roads**
- **Transportation planning and new roads**
- **Pavement Improvement**
- **Traffic Management**

Minimize Private Vehicle Use

- **Improve Public Transport**
- **Expanding road network to reduce trip lengths e.g. East – West Links**
- **Demand Management -- to reduce auto use in congested areas – parking fees, cordon pricing, area licensing etc.**
- **Improve Pedestrian and NMT Facilities**
- **Land use Planning to reduce need for long travels**

Policy Interventions to control Air pollution in Mumbai

- Gathering Scientific information
- Innovative Interdisciplinary Research
- Institutional capacity building
- Stricter Regulatory regime and Enforcement
- Stakeholder Involvement
- Capacity Building
- Sustainable Public Transportation
- Clean vehicle and fuel Technologies
- Improved Inspection and Maintenance programme

Policy Measures

- Banning on plying of more than 8 years old vehicles
- Phasing out of Vehicles
- Strengthen public transport

Thank You

Speaker : Louis Calcagno, *Alternate Fuels Program New York City*
Department of Transport —New York City Air Quality and Alternate Fuels Program

New York City Air Quality and Alternate Fuels Program

Louis Calcagno, PhD
Alternate Fuels Program
New York City DOT
Mumbai, June, 2005

Mission Statement

- To promote the use of clean transportation technologies in the movement of goods and people within the public and private sectors of New York City. To develop incentives and funding mechanisms to assist with the procurement of clean technologies until such time as they are comparable in cost to existing conventionally fueled vehicles. To develop funding and guidance in support of NYC Alternate Fuel Requirements

Environmental/Health Issues and Concerns

- Children in New York City are three times as likely to be hospitalized for asthma as children in the U.S. as a whole
- Hospitalization rates increased 24% between 1987 and 1996. The largest increase -- more than 60% -- were seen in children from low income communities
- Air toxics present in exhaust emissions
- Diesel exhaust recently classified as a carcinogen by the California Air Resources Board
- Greenhouse gas -- Kyoto treaty calls for reductions in CO_2

USEPA FEDERAL REGULATIONS- Clean Air Act of 1990

Established Ambient Air Quality Standard (NAAQS) for

- Ozone
- Carbon Monoxide
- Nitrogen Oxides
- Particulate Matter
- Sulfur Dioxide
- Lead

USEPA FEDERAL REGULATIONS- Clean Air Act of 1990

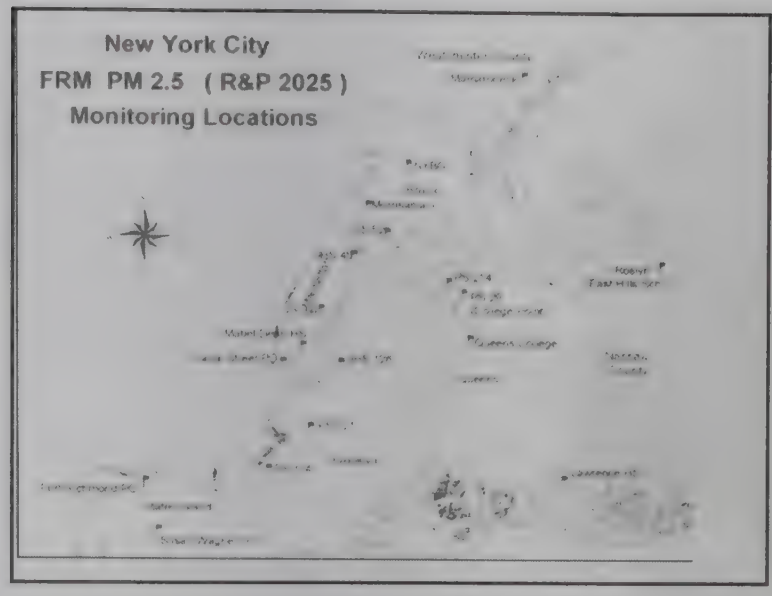
- Requires States to develop implementation plans to control emissions and to reduce concentrations to required levels.
- Federal Authority to sanction for non-compliance. Limit revoke
  - New source construction
  - Federal air assistance and sewage treatment plant grants.
  - Highway trust funds

FEDERAL REGULATIONS- Clean Air Act of 1990

- Federal Implementation Plan (FIP)
  - Parking Restrictions
  - Staggered Work hours
  - Gas rationing.

PM 2.5 Standard has 2 Forms

- Annual standard is 15 micrograms per cubic meter
- Annual standard is met when the 3-year average of annual arithmetic means is less than 15.05 micrograms per cubic meter
- 24-hour standard is 65 micrograms per cubic meter
- New York City exceeds the annual standard.



New York City Municipal Fleet

- Local Law required use of AFV's since 1993
- Over 2900 city fleets vehicles in use today
- CNG sedans, vans and trucks
- Electric sedan, vans , and trucks
- Over 1000 hybrid electric sedans (largest municipal fleet in US)
- Future fleet purchases emission based

Recent Changes to NYC Local Law

- Beginning in 2006 municipal fleet rule
  - Requires the "cleanest in each class to be purchased".
  - Requires improved fuel economy
  - Is fuel neutral.

NY City CNG Station Development

- Funding through Federal consent decree
- 4 New CNG stations
  - 1 Large facility for DOS trucks
  - 3 medium sized sites at City depots

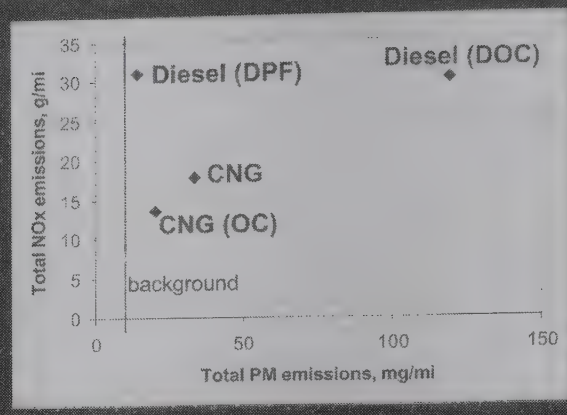
Ethanol/Biodiesel

- DOS operates 350 E85 capable light duty vehicles.
- Opened first E85 site in the Bronx in 2001, 5 more E85 sites opened in 2004/5.
- Biodiesel evaluated in Staten Island Ferry.

New York City DOT
Natural Gas Bus Program

- Total Fleet Size 1291 in 7 Depots
- 9th Largest Fleet in North America
- 352 CNG Buses added since 1994
- 28% CNG busses
- Program transferring to the MTA later in 2005

NO_x and PM Emissions (CBD)



Department of Sanitation
Dedicated Compactor Trucks

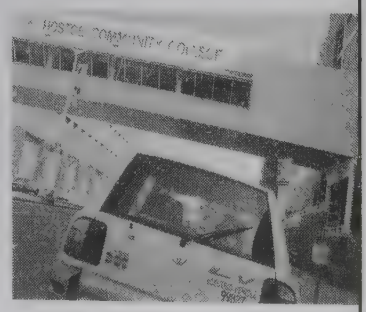
- DOS 26 CNG Compactor Trucks and 5 Sweepers in Operation. All dedicated with 50 DGE of CNG.

Electric Delivery Truck

- 30 Trucks in service with USPS in Man. And Bx.
- designed for urban driving
- speed = 40mph
- range = 40 miles

Battery Electric Fleet

- EV's from Honda, Toyota, Ford, Chrysler and Solectria in fleet.
- The 67 vehicles logged 1 million ZEV miles on the NY City Streets.
- Vehicles leases are now up.



GEM Program

- Over 300 Gems donated to NYC
- Operating in Parks, large facilities, indoor train stations, cultural institutions
- Uses range from concession stands to people movers to equipment movers

CMAQ Private Fleet Program

- CMAQ funded in cooperation with NYSERDA
- Cost share incremental cost
- Funded Manhattan Beer project 30 CNG beverage delivery trucks 2001/02/04
- Recent awards to Federal Express for hybrid trucks and to the Bronx for hybrid electric shuttle buses.
- Received 16 million for next 4 years of funding.

Manhattan Beer

30 Natural Gas delivery trucks funded under the Private Fleet Program. The Truck uses John Deere dedicated CNG engines.

Natural Gas Taxi Program

- CMAQ funded program covers 80% of the incremental cost of vehicle. Began in late 90's with 300 taxis.
- Now less then 100 taxi's
- Barriers include, CNG station access, loss of portion of trunk and loss of Ford product

Truck Stop Electrification

- Clean Air Communities – Non Profit of Gov't , Env. orgs and local Utility
- Goal = reduced Nox
- Hunt's Point Market supplies 80 of regions produce and 40% meat.
- 20,000 diesel truck trips /week
- Trucks idle 8-12 hours waiting to unload

Truck Stop Electrification

- Demo of a 32 bay system
- Driver compartment offered heating cooling and internet access
- External electrical hookup for refrigeration unit
- Benefits: 2275 Tons CO2, 15 Tons Nox 30 Tons CO

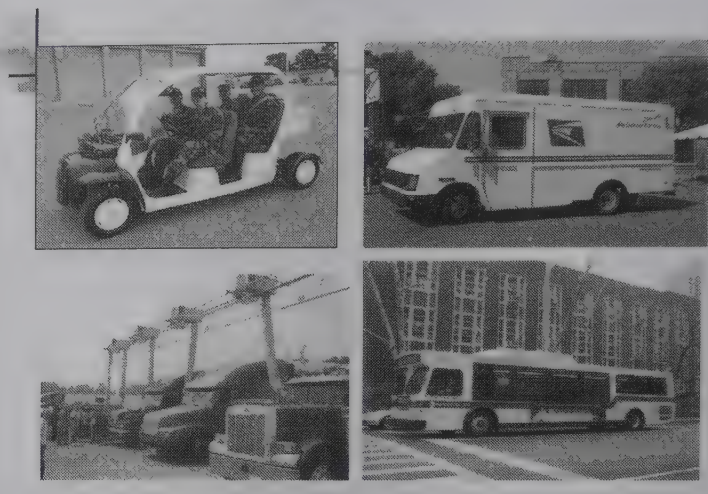
Clean Ferry Initiatives- Staten Island Ferry

- Due to minimal Federal Emissions standards for marine engines. Staten Island Ferry systems emits hundreds of tons of NOx per year.
- Developed a partnership with PANYNJ to install stack emission control system (SCR) on one ferry with expansion to all seven if successful. Program will provide NOx offsets for harbor dredging program for the Port Authority.

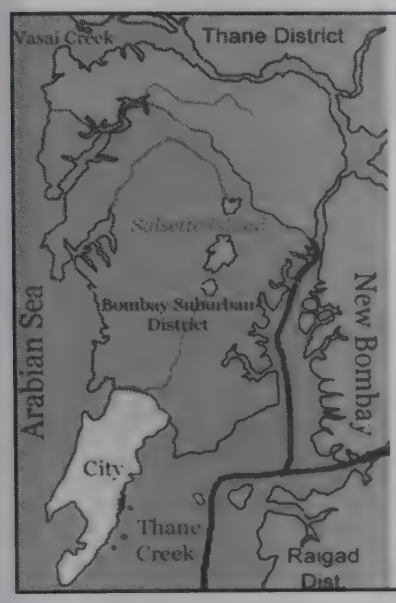
Clean Ferry Initiatives- Private Ferry Fleet

- Partnership with NYSERDA, USEPA, FTA to develop options for reducing emissions on existing boats and offering to subsidize installation on the private ferry system.
- Potential for reducing several hundred tons of NOx annually.

Sustainable New York



Speaker : Rohini Chowgule, *Associate Professor, Pulmonary Medicine, Bombay Hospital*—Mumbai and Asthma



Mumbai And Asthma

Rohini Chowgule MD FCCP

Associate Professor

Pulmonary Medicine

Bombay Hospital

Introduction

- **A rapid increase in asthma prevalence over the last quarter century is difficult to ascribe to genetic alteration.**
- **Therefore the focus for understanding this changing prevalence of asthma has turned to several other factors, such as environment.**

Introduction

They include

a) **Outdoor air pollution, especially ozone and particulates**

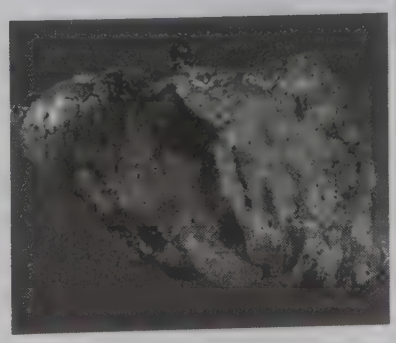
b) **Indoor air contaminants, including bio-allergens such as cockroach faces & dust mites and**

c) **The more frequent development of an atopic immune state, characterized by an increased Th2 ratio**

This immune shift is theorized to be due in part to decreased incidence of respiratory infections, such as measles virus and tuberculosis, in early life.

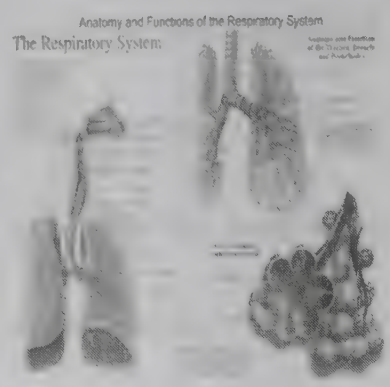
The Lungs

- **They are incredibly delicate organ which is directly exposed to the ravages of our environment in particular air pollution**
- **Only skin is more exposed.**
- **Adult lung moves approximately 10,000 liters of air a day.**



The Lungs

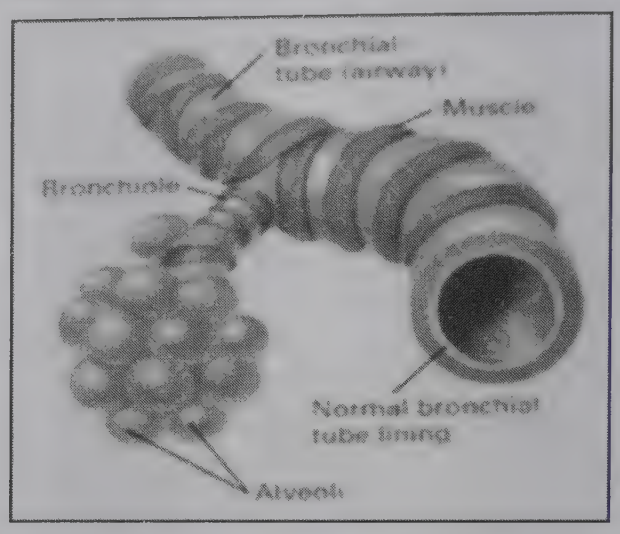
- **It is made up of 300 million tiny air sacs - the alveoli.**
- **If spread out our lungs would cover the surface area of a tennis court .**
- **You take every day about 17,280 breaths without you ever noticing**

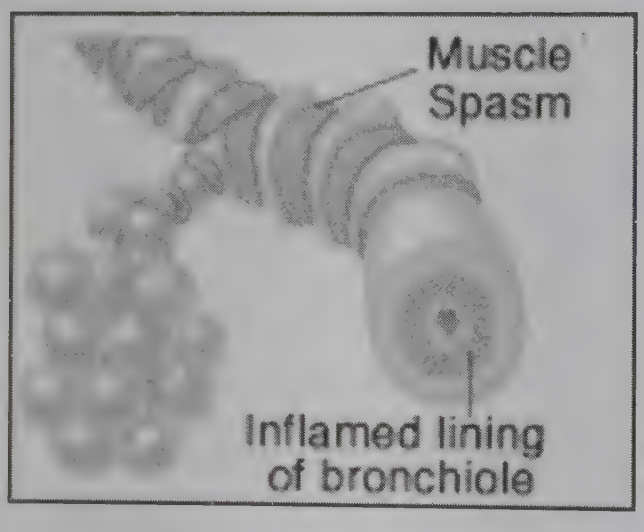


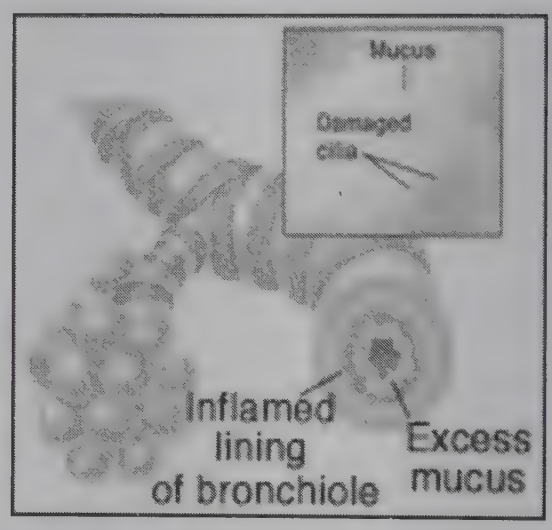
Clinical Definition

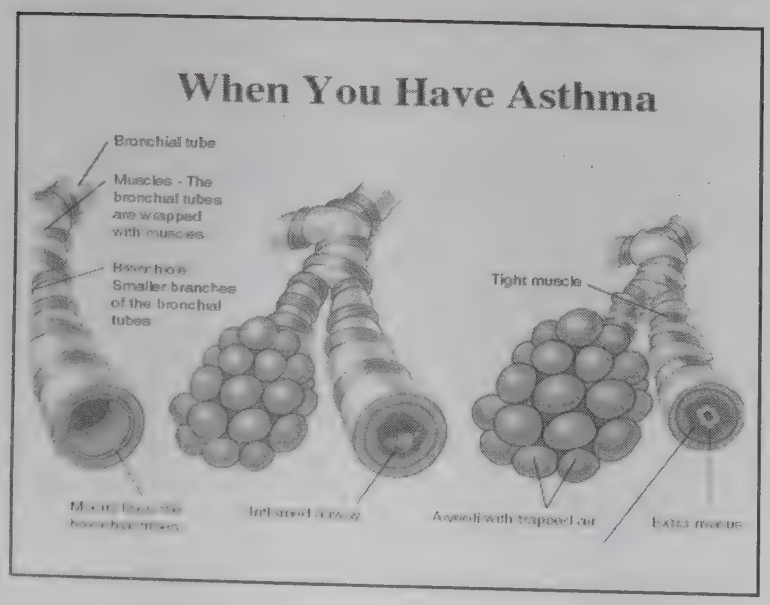
- **Asthma is a chronic episodic disorder in which symptom- free periods are punctuated by exacerbations characterized by decreased airflow and worsening of symptoms including**

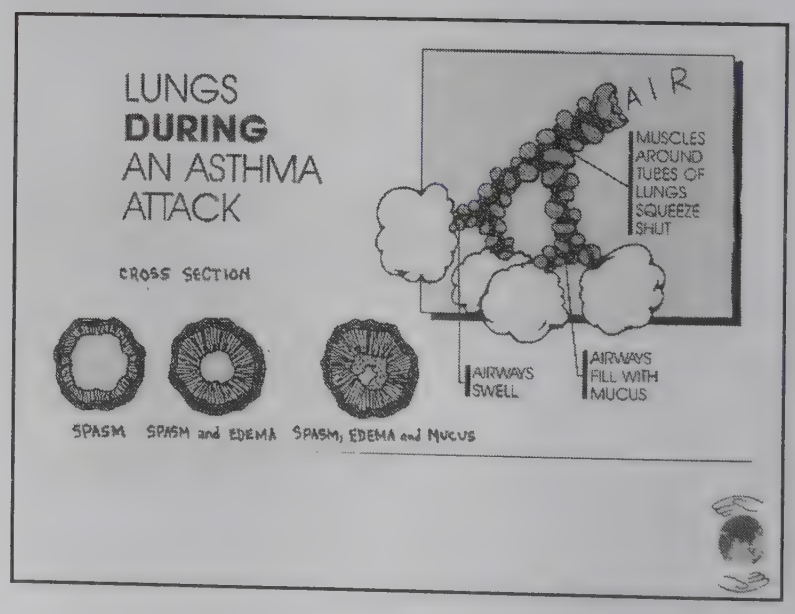
  1. **Shortness of Breath**
  2. **Wheezing**
  3. **Cough and/or Chest Tightness**

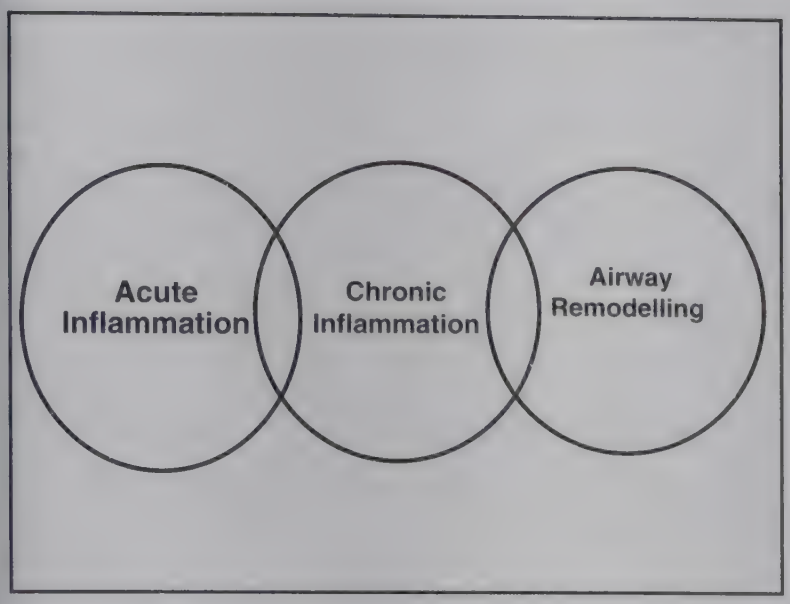


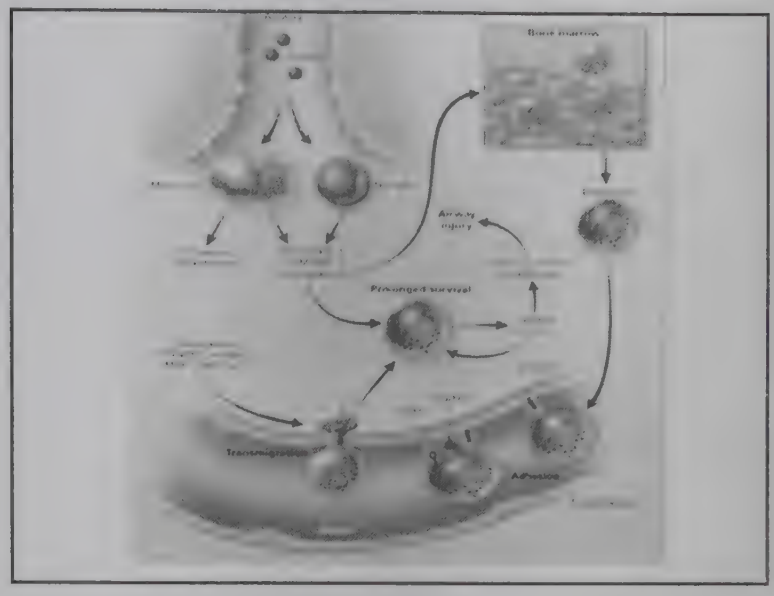


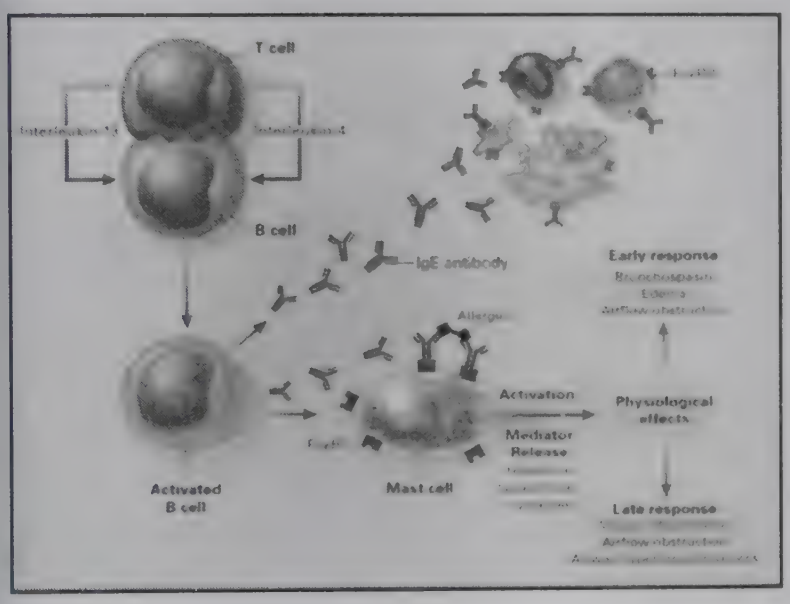


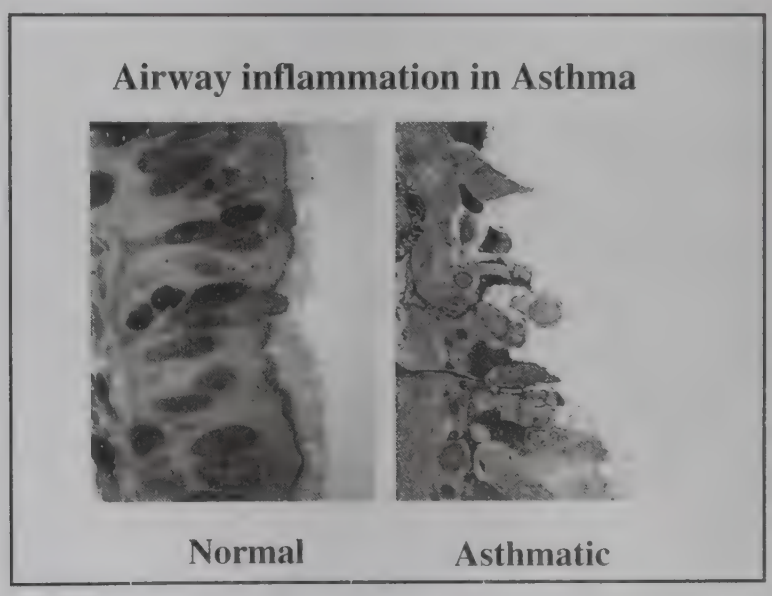

When You Have Asthma
Bronchial tube
Muscles - The bronchial tubes are wrapped with muscles
Bronchiole - Smaller branches of the bronchial tubes
Tight muscle
Inflamed lining
Alveoli with trapped air
Extra mucus

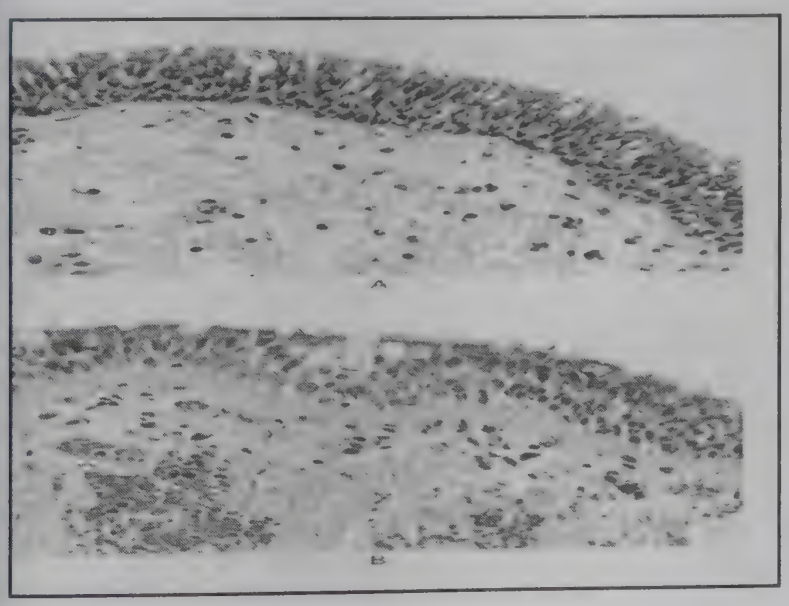


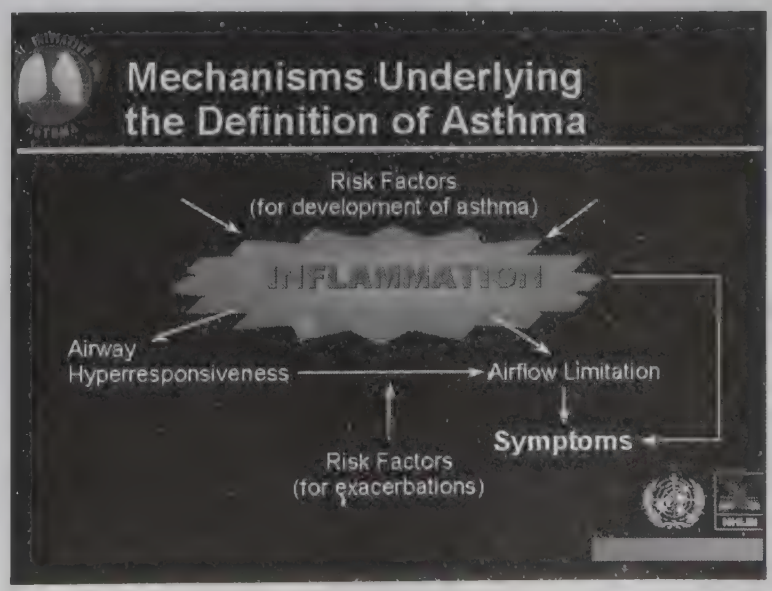

Acute Inflammation
Chronic Inflammation
Airway Remodelling




T cell
B cell
IgE antibody
Allergen
Activated B cell
Mast cell
Activation
Mediator Release
Physiological effects
Early response
Late response


Airway inflammation in Asthma
Normal
Asthmatic




Mechanisms Underlying the Definition of Asthma
Risk Factors (for development of asthma)
INFLAMMATION
Airway Hyperresponsiveness
Airflow Limitation
Symptoms
Risk Factors (for exacerbations)

HOST FACTORS

- Genetic predisposition
- Atopy
- Airway hyperresponsiveness
- Gender
- Race

ENVIRONMENTAL FACTORS

- Indoor allergens

  Domestic mites, Animal allergens, Cockroach allergens, Fungi, molds, yeasts
- Outdoor allergens

  Pollens, Fungi, molds, yeasts
- Occupational sensitizers (5 to 15 %)
- Air pollution- Outdoor & Indoor pollutants

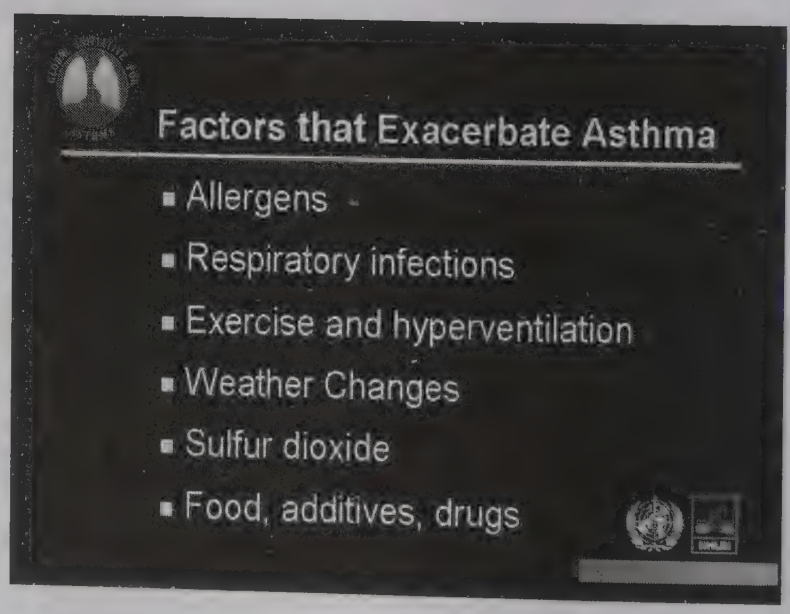
Indoor Allergens - Domestic Mites

- An asthma prevalence study done in Mumbai in 1998 showed that 135/516 (26%) has positive skin testing and house dust was the most common allergen 113/516 (22%).

Chowgule etal AJRCC 280,1998

ENVIRONMENTAL FACTORS

- Tobacco Smoke- Active & Passive Smoking
- Respiratory infections - Hygiene hypothesis
- Parasitic infections
- Socioeconomic status
- Family size



Air Pollution

Consists of two main types :

- Industrial smog (SO2 particulate complex) & Photochemical smog (ozone and nitrogen oxides)
- The great number of variables, epidemiological studies trying to link the rising trend of asthma with ambient pollution have been inconclusive.
- Some studies have shown a significant association of air pollutants such as ozone, sulfur dioxide, nitrogen oxides, organic solvents, acidic aerosols, particulate matter and a whole host of organic compounds with symptoms and exacerbations of asthma.

Air Pollution

- The Indian Institute of Environmental Medicine's air measurement study, done in different locations in Mumbai, showed that

  PM_{10} was between 161 - 605 $\mu g/m^3$,
  and TSPM ranged from 132 - 854 $\mu g/m^3$
  much greater than the normal.

- Asthma prevalence was found to be 17%, and bronchial hyper-reactivity was 27%.

INDOOR POLLUTION

Mumbai is an excellent model to study the Prevalence of disease if one wants to establish an environmental causative factor.

Two phased Asthma prevalence study was done.
Phase I

3500 were randomly selected and 2213 responded

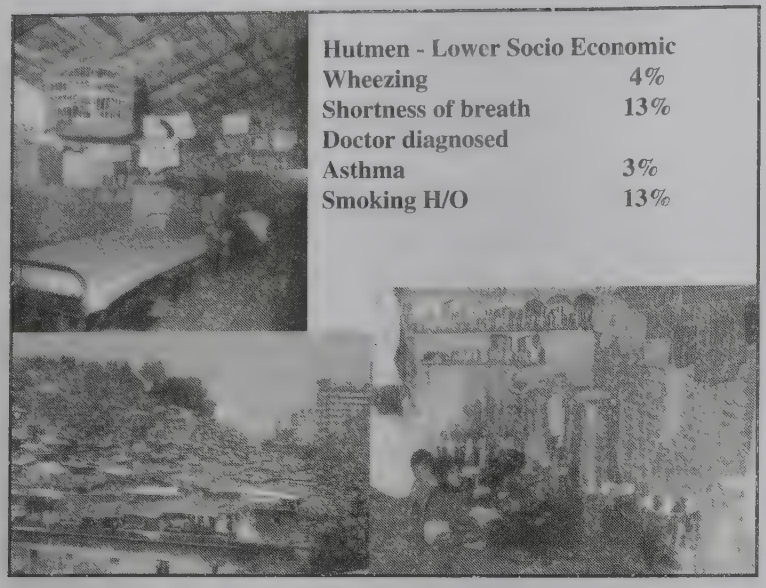
Wheeze	4.3%
Shortness of Breath	6.7%
Attack of cough	11.2%
Asthma	2.7%
Nasal allergy	9.6%

Phase II - 600 subjects
From 2213 responders of Phase I
300 males and 300 females were selected
475 subjects came for detail examination

Wheeze	9.7%
Shortness of Breath	8.6%
Attack of cough	23.5%
Asthma	17.2%
Nasal allergy	9.6%
Bronchial Hyperreactivity	26%

Wheezing	8%
Shortness of breath	9%
Doctor diagnosed Asthma	5%
H/O Smoking	18%

Lower Middle Socio - Economic Class



Hutmen - Lower Socio Economic

Wheezing	**4%**
Shortness of breath	**13%**
Doctor diagnosed Asthma	**3%**
Smoking H/O	**13%**

Higher Socio – Economic Group

Wheezing	15%
Episodic Dry Cough	13%
Shortness Of Breath	5%
Asthma	9%
Smoking	20%

Relationship of Early Life Asthma to Adult Asthma

- **6% of children are suffering from asthma (ISAAC)**
- **40% of children wheeze in 1st year of life**
- **80-90% of all asthma diagnosed by age 6**
- **Recall bias of early life (< age 6) events common**
- **Intermediate phenotypes are present in most young adults**

Allergy	**50%**
Methacholine AR	**25%**

ASSOCIATION OF ASTHMA AND RHINITIS

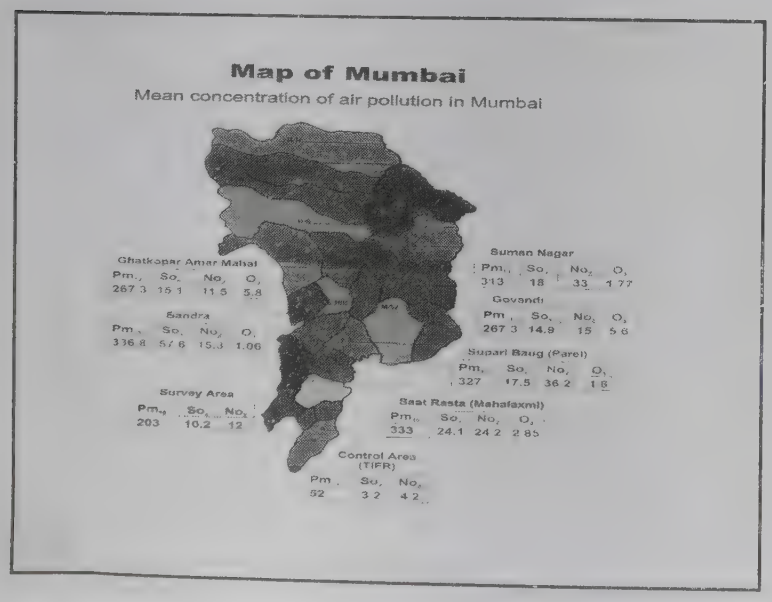
Asthma : 60-78% have rhinitis

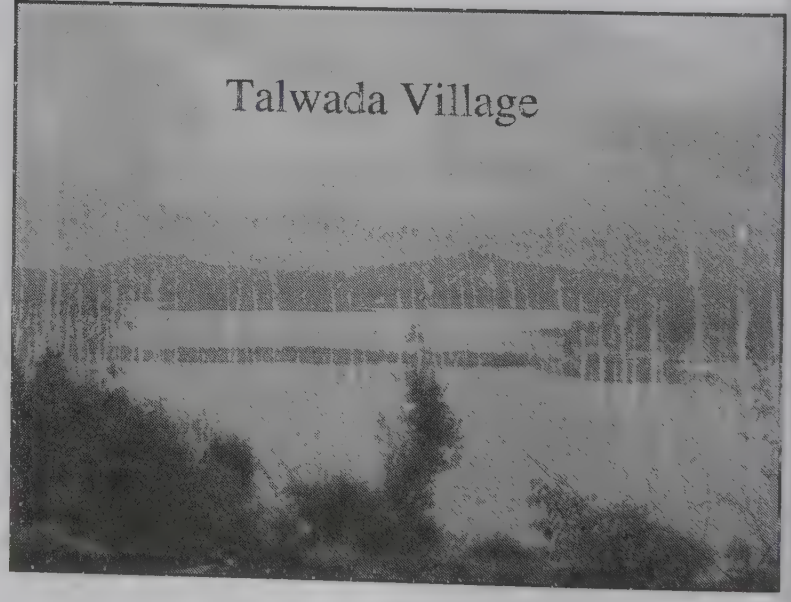
Allergic rhinitis :

20-38% have asthma

30% have BHR to MC without wheezing

32%-50% have no BHR





Talwada Village - People
less than 2% people suffer from Asthma

The hygiene hypothesis

- **Improvement in hygiene and reduced recirculation of common infections is strongly associated with the increasing prevalence of atopy and atopic diseases in Western countries.**
- **Respiratory allergy is less frequent in people heavily exposed to orofecal and foodborne microbes.**

The hygiene hypothesis

- **Hygiene and a Westernized, semisterile diet may facilitate atopy by influencing the overall pattern of commensals and pathogens that stimulate the gut-associated lymphoid tissue, thus contributing to the epidemic of allergic asthma and rhinitis in developed countries.**

Discussion

S P Singal: Why do people living in highrise buildings have a higher incidence of asthma than those living in slums asthma?

Rohini Chowgule: A large number of people move from other rural parts to cities. They live in such conditions in slums that make them develop a defence mechanism.

Michael Fisher: Is there a program that looks at NOx emissions from cabs?

Louis Calcagno: In diesel vehicles there is a water emulsion system, which allows water to enter the engine in the form of mist along with diesel. This breaks up the diesel, thus reducing pollution. But there is a power loss. However, there is an increase in fuel efficiency.

There is no specific NOx control in Mumbai. There are however methods to measure NOx levels in place. All CNG buses now have 3-way catalysts and water spray systems.

Sudhakar Malpe: Why is only 28% of the New York bus fleet running on CNG? Why is there no government intervention?

Why not reduce dependence on car travel instead of reducing emissions?

Louis Calcagno: The fleet is being moved over to MTA, which has a different system of operation.

A lot of vehicles are not from the city (New York). Can't control the pollution that they create. 80%- 90% of people in New York use mass transit systems.

Sapna Pandya: What are the studies being done on attitudes, beliefs on asthma in the general population of India?

Rohini Chowgule: Asthma is a slow acting disease. There is no sense of urgency. Many doctors don't like to talk about asthma. Earlier it was diagnosed as allergic cough, bronchitis, etc. There is also a social stigma surrounding it, particularly among young women. Asthma has not been given much media attention. There is little public awareness about this disease. There is no government initiative because there aren't many prevalence studies. Unlike HIV, asthma has not had a big impact, since it is a slow disease. Things are changing now. Other forms of treatment are also available, eg, homeopathy, Aryurveda, fish medicine, etc.

Sundeep Salvi: Cooking gas is a common source of NOx. Is there any interest in indoor air pollution monitoring? What steps are being taken to control indoor air pollution?

There is not much emphasis on indoor air pollution, though awareness about it is growing. Indoor air quality monitoring has begun to be done only recently.

Litigation options have not been explored for indoor air quality. Partnership for clean indoor air is required. Much of the work cannot be regulatory so only voluntary programmes can address this issue effectively.

Plenary Session 3 : Responses to Air Pollution and Its Health Impacts

Chair : S R Kamat

Retd Professor, Respiratory Medicine Department

KEM Hospital, Mumbai.

Speaker : B Sengupta, *Member Secretary, Central Pollution Control Board, Delhi* —
Regulatory response to air pollution in India

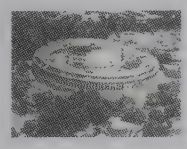
REGULATORY RESPONSE TO AIR POLLUTION IN INDIA

Dr. B. Sengupta
Member Secretary
Central Pollution Control Board
Ministry of Environment & Forests
New Delhi
Email: bsg1951@yahoo.com
Website: http://cpcb.nic.in

Paper for presentation at International Workshop on Environmental Health – Children's Asthma to be held at Bombay Hospital organised by Cerana Foundation and USEPA, during 14 – 15 June, 2005

MAJOR ENVIRONMENTAL ACTS IN INDIA

- The Water (Prevention & Control of Pollution) Act, 1974
- The Water (Prevention & Control of Pollution) Cess, Act, 1974 as amended in 1991.
- The Air (Prevention & Control of Pollution) Act, 1981
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The National Environmental Tribunal Act, 1995
- The National Environment ppellate Authority Act, 1997



MAJOR AIR POLLUTION ISSUES IN INDIA

1. **Major Cities (Vehicular Air Pollution)**
2. **24 – Critically polluted area (Industrial Air Pollution)**
3. **Indoor Air Pollution (Rural Area) and Air Pollution in work zone area**

REASONS FOR HIGH AIR POLLUTION IN INDIA

- QUALITY OF FUEL (COAL, DIESEL, PETROL, FUEL OIL)
- TOXIC AND HAZARDOUS AIR POLLUTION EMISSION FROM CHEMICAL INDUSTRIES
- PROCESS TECHNOLOGY (SPECIALLY IN S.S.I.)
- SITING OF INDUSTRIES SPECIALLY INDUSTRIAL ESTATES
- NO POLLUTION PREVENTIVE STEP TAKEN (EARLY STAGE OF INDUSTRIALISATION)
- PREDOMINANCE OF 2-STROKE VEHICLES
- UNCONTROLLED GROWTH OF VEHICLE POPULATION
- INADEQUATE POLLUTION PREVENTION AND CONTROL SYSTEM IN SMALL/ MEDIUM SCALE INDUSTRY (S.M.S)
- POOR COMPLIANCE OF STANDARD IN S.M.S.

AIR POLLUTION ISSUES IN NCR DELHI

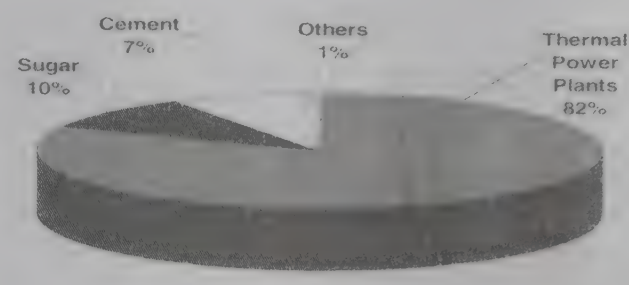
- Large number of 2 stroke vehicles (70% of total vehicle population)
- Adulteration of petrol/diesel
- Large number Diesel Buses (now changed to CNG Mode)
- Large number of small scale industries using furnace oil having sulphur more than 3.5%
- Large number of operating DG Sets (more than 1.5 lakhs) emitting SO_2, NOx and PM_{10}.
- Three coal based power station emitting SO_2 and NOx and generating fly ash.
- 24 Industrial Estate where large number of small air polluting industries are located, and poor compliance of Emission Standard.

Component of Air Quality Management Plan

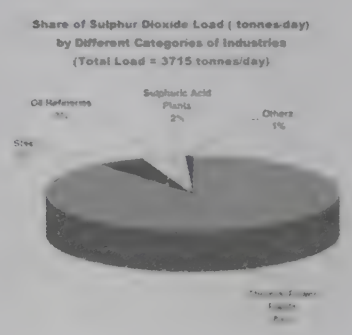
- Fixing air quality target / objective
- Proper Inventory of air pollution sources (Industry, vehicular, domestic sources)
- Pollution load estimation using appropriate emission factor
- Air Quality Monitoring (Manual / Continuous)
- Health Impact Study
- Source Apportionment Studies (Pollutants, Area, Model)
- Formulation of action plan based on above mentioned studies.
- Implementation of Action Plan (All stack holders must be involved with proper accountability)
- Periodically review of Action Plan based on AQM and Health Data.

INVENTORY OF INDUSTRIAL EMISSIONS IN THE COUNTRY

EMISSION ESTIMATES



Share of Suspended Particulate Matter Load (tonnes/day) by Different Categories of Industries (With Control Device), Total Load = 5365 tonnes/day



Gaps in Emission Inventory of Industrial Sources

- For 17 categories of highly polluting industries data are available in SPCB / CPCB.
- Emission factor available for highly polluting industries (TPP, Cement Plant, Oil Refineries etc)
- For S.S.I. (3.5 Million) complete data not available (stone crusher, brick kiln, re- rolling mills, hot mix plants, etc.)
- Emission factor not available for all SSI units.

VEHICULAR POLLUTION PROBLEMS IN INDIA

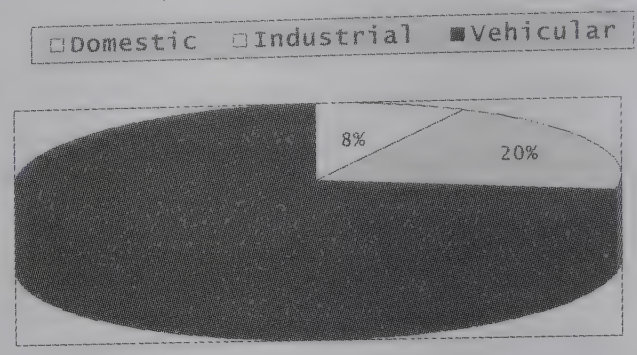
- High vehicle density in Indian urban centers
- Older vehicles predominant in vehicle vintage
- Inadequate inspection & maintenance facilities
- Predominance of two stroke two wheelers
- Adulteration of fuel & fuel products
- Improper traffic management system & road conditions
- High levels of pollution at traffic intersections
- Absence of effective mass rapid transport system & intra-city railway networks
- High population exodus to the urban centers

INVENTORY OF VEHICULAR EMISSIONS IN THE COUNTRY

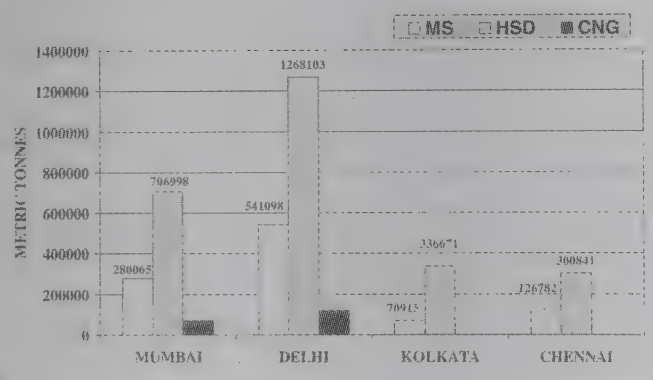
ESTIMATED AIR POLLUTION LOAD IN MAJOR CITIES

CITY	POLLUTION LOAD (TONNES/DAY)	NUMBER OF ON-ROAD VEHICLES (LAKHS)
Delhi	2686	35.5
Mumbai	885	8.4
Bangalore	971	12.4
Kolkata	449	6.6
Chennai	786	11.5
Ahmedabad	638	7.8
Hyderabad - Secunderabad	1123	10.99

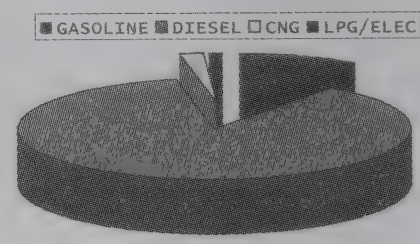
CONTRIBUTION OF VARIOUS SECTORS TO AMBIENT AIR QUALITY IN DELHI



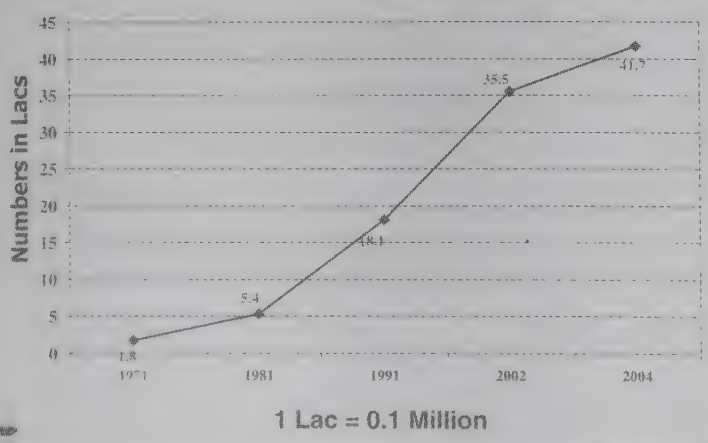
FUEL CONSUMPTION IN METRO CITIES



FUEL SHARE IN DELHI



GROWTH OF MOTOR VEHICLES IN U.T OF DELHI



1 Lac = 0.1 Million

AIR QUALITY MONITORING IN DELHI

NATIONAL AIR QUALITY MONITORING

Started in 1984 - 7 Station
(Manual Station)

- By 2000 - Increased to 295 Stations (Operated and Maintained by SPCB /CPCB / Universities, etc. and funded by CPCB)
- Monitoring in Delhi
  3 Continuous AQMS
  2 Mobile Vans
  6 Manual AQMS
  6 Integrated Air Quality Monitoring Station being set up
- About 300 continuous stations maintained by large scale industries.

Air Quality Monitoring

Parameters Monitored

Criteria Pollutants - SPM, SO_2, RSPM/PM_{10}, NOx, CO, Pb

Specific Pollutants - Poly aromatic Hydrocarbons
Benzene / Xylene / Toluene
Ground level ozone
(24 hourly, 8 hourly, 1 hourly)

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutant	Time Weighted Average	Concentration in Ambient Air: Industrial Area	Residential, Rural and other Areas	Sensitive Area	Method of Measurement
Sulphur Dioxide (SO_2)	Annual Average*	80 µg/m³	60 µg/m³	15 µg/m³	1. Improved West and Gaeke Method 2. Ultraviolet Fluorescence
	24 Hours Average**	120 µg/m³	80 µg/m³	30 µg/m³	
Oxides of Nitrogen as NO_2	Annual Average*	80 µg/m³	60 µg/m³	15 µg/m³	1. Jacob & Hochheiser modified (NaOH-$NaAsO_2$) Method 2. Gas Phase Chemiluminiscence
	24 Hours Average**	120 µg/m³	80 µg/m³	30 µg/m³	
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m³	140 µg/m³	70 µg/m³	High Volume Sampling (Average flow rate not less than 1 1m³/minute)
	24 Hours Average**	500 µg/m³	200 µg/m³	100 µg/m³	
Respirable Particulate Matter (Size less than 10µm) (RPM)	Annual Average*	120 µg/m³	60 µg/m	50 µg/m	Respirable Particulate Matter Sampler
	24 Hours Average**	150 µg/m³	100 µg/m	75 µg/m	
Lead (Pb)	Annual Average*	1.0 µg/m³	0.75 µg/m³	0.50 µg/m³	AAS Method after sampling using EPM 2000 or equivalent filter paper
	24 Hour Average**	1.5 µg/m³	1.0 µg/m³	0.75 µg/m³	
Carbon Monoxide (CO)	8 Hours Average**	5.0 mg/m³	2.0 mg/m	1.0 mg/m	Non dispersive Infrared Spectroscopy
	1 Hour Average	10.0mg/m	4.0 mg/m	2.0 mg/m	
Ammonia (NH_3)	Annual Average*		0.1 mg/m		
	24 Hour Average**		0.4 mg/m		

NOTE

Sensitive areas – sensitive area may include the following:

1) 10 kms all around the periphery of health resorts so notified by State Pollution Control Boards in consultation with department of public health of the concerned state.

2) 10 kms all around the periphery of biosphere reserves, sanctities and national parks, so notified by Ministry of Environment and Forest or concerned states.

3) 5 kms all around the periphery of an archeological monument declared to be of national importance or otherwise so notified A.S.I. in consultation with State Pollution Control Boards.

4) Areas where some delicate or sensitive to air pollution crops/important to the agriculture/horticulture of that area are grown so notified by State Pollution Control Boards in consultation with department of agriculture/horticulture of concerned state.

5) 5 kms around the periphery of centers of tourism and/or pilgrim due to their religious, historical, scenic or other attractions, so notified by department of tourism of the concerned state with State Pollution Control Boards.

NON-ATTAINMENT AREAS

$$\text{Exceedence Factor} = \frac{\text{Observed Annual Mean Concentration of a Criterion Pollutant}}{\text{Annual Standard for the Respective Pollutant and Area Class}}$$

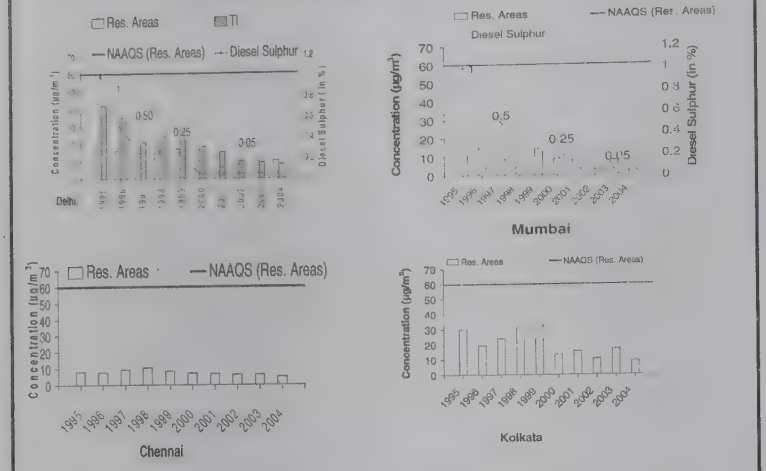
The Four Air Quality Categories are:

- Critical Pollution (C): When EF is more than 1.5;
- High Pollution (H): When EF is between 1.0 - 1.5;
- Moderate Pollution (M): When EF is between 0.5 - 1.0;
- Low Pollution (L): When the EF is less than 0.5.

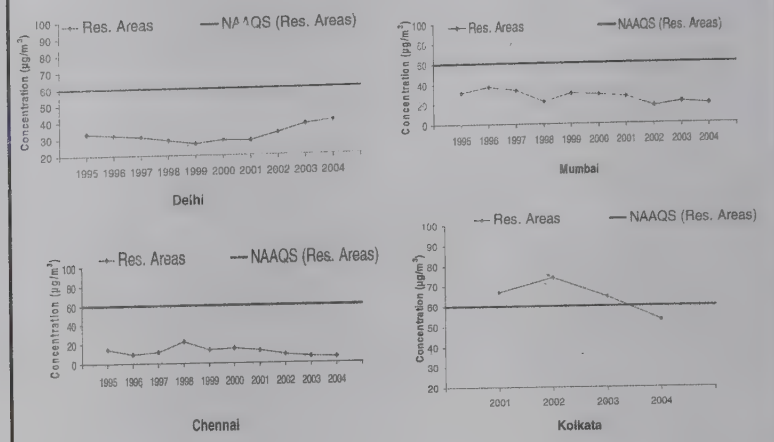
Air Quality Status of India During 2003

Pollutants	Industrial				Residential			
	L	M	H	C	L	M	H	C
Sulphur dioxide	98 %	2 %	-	-	98 %	2%	-	-
Nitrogen dioxide	85 %	12%	3%	-	70%	25%	5%	-
Respirable Suspended Particulate Matter	13 %	37%	28 %	22 %	2%	17%	28%	53%
Suspended Particulate Matter	31%	46%	18 %	2%	5%	17%	26%	52%

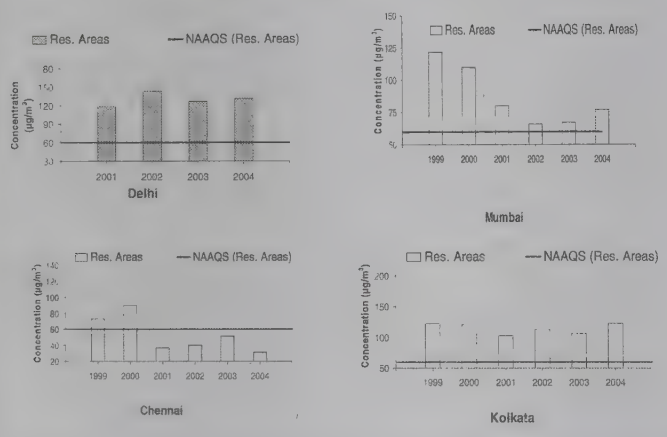
Trends in SO_2



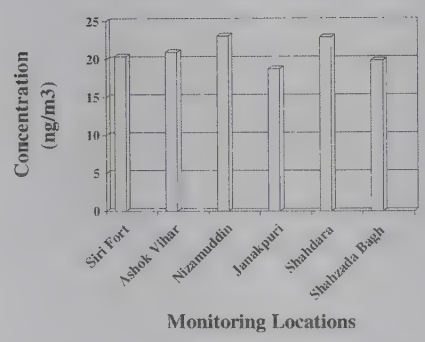
Trends in NO_2



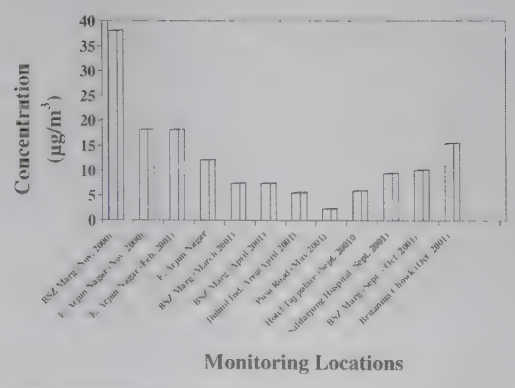
Trends in RSPM



TOTAL PAHS (NG/M³) IN DELHI DURING 2000-2001



BENZENE LEVELS IN DELHI



TYPICAL VALUES OF SPM / PM_{10} / $PM_{2.5}$ IN DELHI

SPM	PM_{10}	% of PM_{10} with respect to SPM	$PM_{2.5}$	% of $PM_{2.5}$ with respect to RSPM
547	343	63	102	30
672	378	56	58	15
657	540	82	91	17
658	428	65	102	24
478	442	92	80	18
500	303	61	68	22

All values are in µg / m³

CONCLUSION OF AIR QUALITY MONITORING (LAST TEN YEARS)

Critical Pollutants (exceeded the standard)

- **RSPM (PM_{10})**
- **Carbon Monoxide**
- **Benzene**
- **Ozone (some places)**
- **Polyaromatic Hydrocarbon (Benzo – a-Pyrene)**
- **Oxides of Nitrogen (Some places)**

Within Standard

- Sulphur Dioxide
- Lead

Epidemiological Studies of Air Pollutants Initiated by CPCB in India

1. Epidemiological Study to find the Effect of Air Pollutants especially Respirable Suspended Particulate Matter (RSPM) and other carcinogens on Human Health in Delhi – CNCI, Kolkata
2. A Study on Ambient Air Quality, Respiratory Symptoms and Lung Function of Children in Delhi – CNCI, Kolkata
3. Effects of Environmental Pollution on the Status of Human Health of Delhi Residents – AIIMS, New Delhi
4. Human Risk Assessment Studies in Asbestos Industries in India- ITRC, Lucknow
5. The Environmental benefits Mapping and Analysis Program for International Applications (BenMAP – International) Training and Demonstration in India - USEPA

I - Epidemiological Study to find the Effect of Air Pollutants especially Respirable Suspended Particulate Matter (RSPM) and other carcinogens on Human Health in Delhi – CNCI, Kolkata

Objectives :

- To prepare a database on air pollution related respiratory symptoms among the residents of Delhi.
- To assess the degree of lung function impairment in persons chronically exposed to city's air.
- To explore the underlying mechanism of air pollution related pulmonary dysfunction at the cellular and subcellular level.

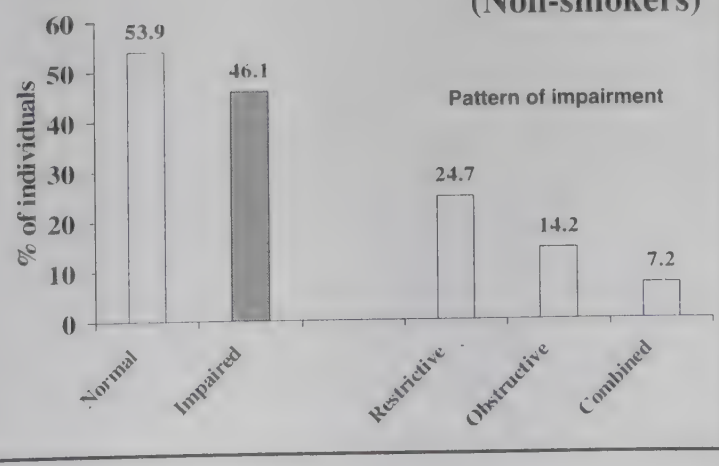
Progress

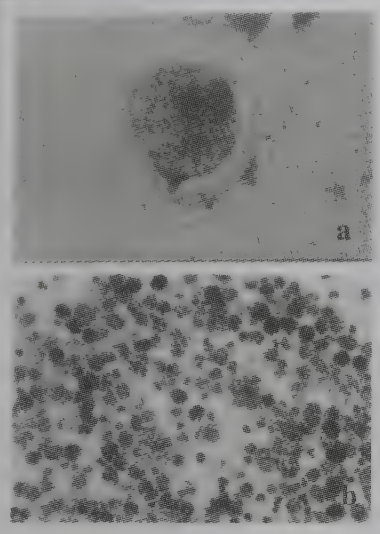
- 2379 individuals (725 female and 1654 male) have been surveyed through questionnaires
- 1270 individuals have been clinically examined & samples collected.
- The age - 20-75 years.
- 36 camps have been held during Nov. 2002 to April 2004 in various parts of Delhi

Findings of Interim Report:

- High prevalence of respiratory symptoms, impairment of lung function, numerical, structural & functional alterations of AM, alterations in RBC, WBC & platelets, genotoxic & immunological alterations
- Respiratory symptoms, lung function impairment and alterations in AM show significant correlation with RSPM levels.
- Multiple regression analysis shows significant correlation of the alterations with sex, socio-economic status, occupation & duration of exposure.
- Taxi drivers, people of low socio-economic status & residents of Central Delhi are the most affected group.

Lung function impairment in residents of Delhi (Non-smokers)





a) Multinucleated macrophage

b) Sputum of taxi driver showing marked increase in particle laden macrophage

II - Study on Ambient Air Quality, Respiratory Symptoms and Lung Function of Children in Delhi - CNCI, Kolkata

Objectives

- Assessment of the respiratory health status of school children chronically exposed to ambient air pollution of Delhi
- Establishment of a database relating to pollution related respiratory problems among children of the city.

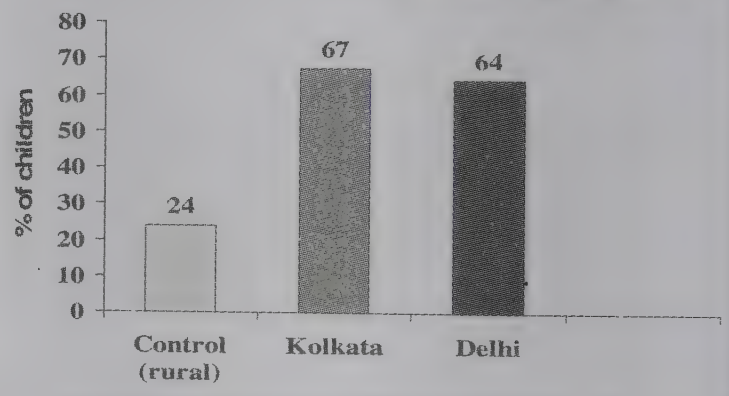
Progress

- Health camps have been held in 12 schools till July 2004 in various parts of Delhi.
- 4671 students (3247 boys and 1424 girls) have been surveyed for respiratory health status.

Findings of the Interim Report

- Upper respiratory symptoms such as common cold & fever, sore throat, running/stuffy nose and sinusitis have been observed.
- Lower respiratory symptoms such as dry cough, cough with phlegm, breathlessness, chest discomfort and wheezing have been observed.
- Associated symptoms that have been observed are asthma, allergy, headache, eye irritation, nausea and palpitation.
- Lung function impairment (restrictive, obstructive and combined) was observed in school children on Delhi.

Lung function impairment in children of Kolkata & Delhi



GUIDELINES FOR FOR AQ ACTION PLAN ISSUED BY CPCB

- **Air Quality Target : Mention the air quality standards, its significance. Whether the standards are made stricter than the National standards.**
- **Air Quality monitoring Programme : Describe the monitoring programme giving the number of stations, locations, monitoring agency, pollutants monitored, data processing system and dissemination.**
- **Inventory of emission load; Some estimations on inventory of emission load from vehicles, industries, domestic sources, etc may be given.If not done, proposal for such study may be provided.**

GUIDELINES FOR FOR AQ ACTION PLAN ISSUED BY CPCB

- **Proportion contribution of various sources like vehicles, industry, domestic etc. to be estimated through modeling. If not done a proposal for such study may be given.**
- **Steps taken so far for control of air pollution:various steps taken so far to control air pollution and their impact on the air quality may be described.**
- **Road map for controlling vehicular pollution ; The roadmap as proposed by the Central Government (Auto-fuel policy) may be mentioned.**
- **Roadmap for controlling air pollution from other source may also be mentioned.**

CRITICALLY POLLUTED CITIES IDENTIFIED BY SUPREME COURT

The Hon'ble Supreme Court identified 16 cities in total & passed respective orders for formulation and implementation of action plan for control of air pollution

April – 2002 Order	May – 2002 Order	August – 2003 Order
Agra	Kolkata	Ahmedabad
Lucknow	Pune	Kanpur
Jharia	Kanpur	Lucknow
Kanpur	Ahmedabad	Solapur
Varanasi		Bangalore
Faridabad		Chennai
Patna		Hyderabad
Jodhpur &		Mumbai &
Pune		Kolkata

STEPS TAKEN TO IMPROVE AIR QUALITY IN NCR-DELHI

I. INDUSTRIAL POLLUTION CONTROL

- → Use of beneficiated coal (having ash 34%) made mandatory in Thermal Power Plant.
- → Closure of hazardous air polluting industries.
- → Shifting of highly polluting industries from non-conforming areas (residential area) to conforming area (approved industrial area).
- → Emission standard for DG Sets (Portable and Stationery sets)
- → Notification and approved fuel for UT of Delhi
- → Upgradation of ESP's in three coal based power station in Delhi.
- → Use of LDO instead of coal in small boilers.

II. EMISSION REUCTION FROM VEHICLES BY INTRODUCING STRICTER NORMS

Norms	Year of Implementation
1996	1996
1998 (Cat. Convertor Norms)	1998
Bharat Stage I (Euro I)	1999
Bharat Stage II (Euro II)	2000/2001
Bharat Stage III (Euro III)	April, 2005
Bharat Stage IV (Euro IV)	April, 2010

VEHICULAR POLLUTION CONTROL

III. Fuel Quality Improvement

Norms	Year of Implementation
0.5% S – Diesel	1996
0.25% S – Diesel	2000
0.05% S – Diesel	2003
0.035% S – Diesel	2005
Unleaded Petrol	2000
Low Smokes 2 T oil	1998

IV. APPROVED FUEL FOR U.T. OF DELHI

- Coal with low sulphur (S - 0.4%)
- Fuel oil / LDO/ LSHS / with low sulphur (S – 1.8%)
- Motor gasoline (as per specifications given in the notification dated 2-4-96 of the Ministry of Environment and Forests, annexed hereto)
- Diesel (as per specifications given in the notification dated 2-4-96 of the Ministry of Environment and Forests, annexed hereto)
- Liquid petroleum Gas (LPG)
- Compressed Natural Gas(CNG)
- Kerosene
- Naphtha (for power station)
- Aviation turbine fuel (for aircraft)
- Fire wood (only for domestic use in rural areas and crematorium)
- Bio - Gas

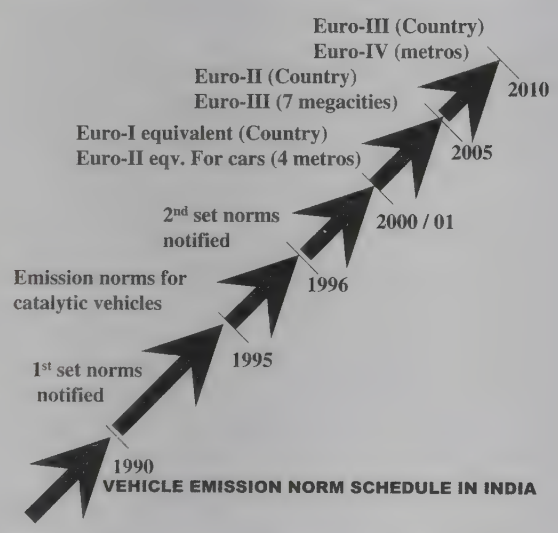
Source: Gazette Notification of Delhi Govt.

V. ALTERNATE FUEL USE IN NCR DELHI

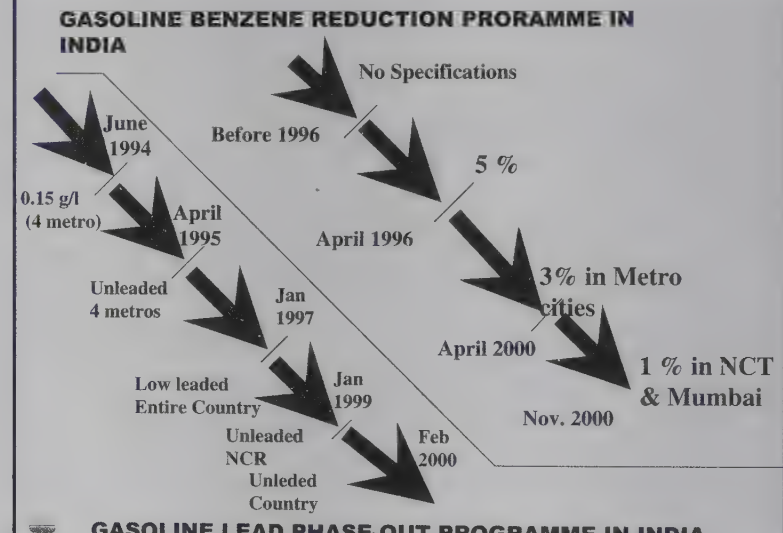
- CNG – Norms notified and more than 80,000 CNG vehicles plying in Delhi
- LPG – Norms notified, LPG kits approved
- Gasoline with 5% ethanol from 2003 in sugar producing states & UT to be extended to other states and Union Territories. 10% to be introduced by 2007
- Bio – diesel (5%) by 2005 & Bio – diesel (10%) by 2011

VI. RESTRICTION ON GROSSLY POLLUTED VEHICLES IN DELHI

- 15 YEARS OLD COMERCIAL VEHICLES PHASED OUT IN DELHI
- CITY DIESEL BUSES PHASED OUT IN DELHI AND INTRODUCTED CLEAN FUEL (CNG) BUSES

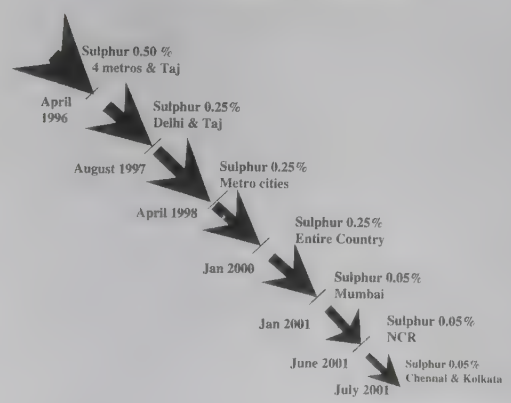


VEHICLE EMISSION NORM SCHEDULE IN INDIA



GASOLINE LEAD PHASE-OUT PROGRAMME IN INDIA

DIESEL SULPHUR REDUCTION PROGRAMME IN INDIA



VII. ROAD MAP FOR VEHICULAR EMISSION NORMS FOR IN-USE VEHICLES

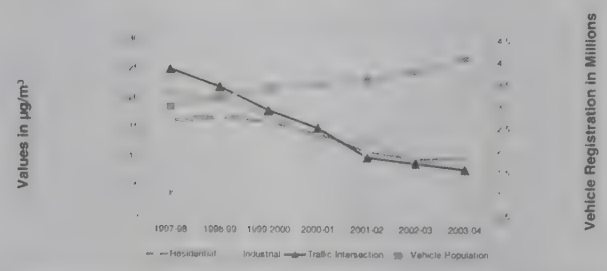
Activities	Applicable for Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Kanpur, Pune
New PUC Checking System for all categories of vehicles	1 April 2002
Inspection & Maintenance system for all categories of vehicles	1 April 2003
Performance Checking of catalytic converters and conversion kits in failed in vehicles	1 April 2005
Announcement of city public transport system	Not later than 1 April 2004
Emission norms for city public service vehicles	**City Buses and Taxis** **From 1 April 2004** Registered after 1 April 1998 : Applicable norms on date of registration Before 1 April 1998 : 1996 emission Norms **From 1 April 2008** Registered after Bharat II norms : applicable norms at time of registration Registered before introduction of Bharat II norms : Bharat 2000 norms **3 wheelers** **From 1 April 2004** Registered after 1 April 2000 : Applicable norms on date of registration Before 1 April 2000 : 1996 emission norms **From 1 April 2008** Registered after 1 April 2000 : Applicable norms at time of registration, before 1 April 2008 : Minimum Bharat 2000 emission norms
Low sulphur fuel (Diesel and Petrol) Minimum India 2000 Minimum Bharat Stage II	**From 1 April 2004** Registered after 1 April 2000 : Bharat 2000 Before 1 April 2000 : 1996 emission norms **From 1 April 2008** Registered after 1 April 2000 : Bharat Stage II Before 1 April 2000 : Minimum Bharat 2000 emission norms

AGENCIES INVOLVED

- Central Pollution Control Board
- Ministry of Environment & Forests
- Environmental Pollution Control Authority
- Ministry of Petroleum & Natural Gas
- Ministry of Road Transport & Highways
- Ministry of Industries

Impacts of Interventions on the Air Pollutants

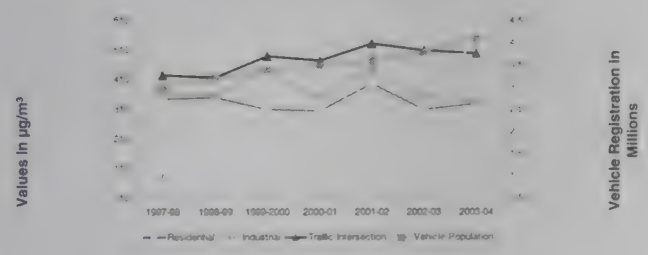
Sulphur Dioxide(SO_2) levels in Ambient Air



Year	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04
Residential	16	17	16	14	11	9.8	10
Industrial	21	20	17	13	13	9.2	10
Traffic Intersection	25	22	18	15	10	9	8
Vehicle Population	3	3.2	3.4	3.5	3.6	3.8	4.1

Impacts of Interventions on the Air Pollutants

Suspended Particulate Matter (SPM) levels in Ambient Air



Year	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04
Residential	345	349	311	304	387	311	330
Industrial	363	361	439	354	442	349	339
Traffic Intersection	426	418	490	476	533	509	500
Vehicle Population	3	3.2	3.4	3.5	3.6	3.8	4.1

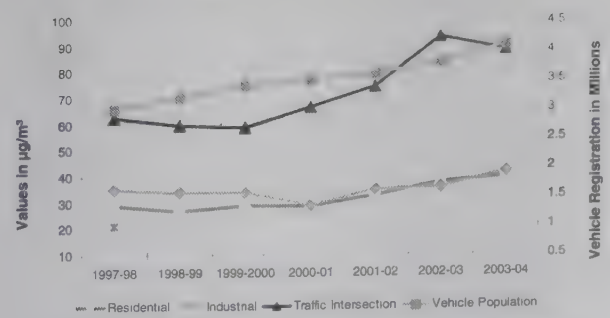
Impacts of Interventions on the Air Pollutants

Respirable Suspended Particulate Matter (RSPM) levels in Ambient Air

Year	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04
Residential	NA	NA	NA	120	139	127	131
Industrial	NA	NA	NA	150	167	140	140
Traffic Intersection	200	216	191	180	270	244	228
Vehicle Population	3	3.2	3.4	3.5	3.6	3.8	4.1

Impacts of Interventions on the Air Pollutants

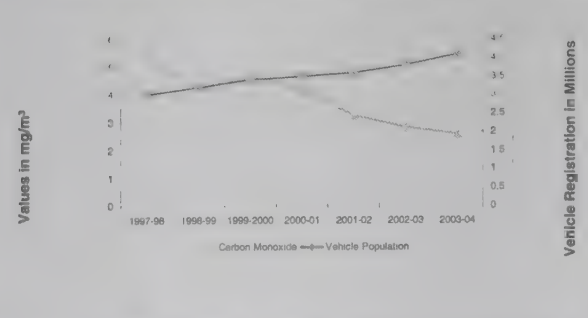
Oxides of Nitrogen (NOx) levels in Ambient Air



Year	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04
Residential	29	27	29	28.7	33	37.9	40
Industrial	35	34	34	29	35	36	42
Traffic Intersection	63	60	59	67	75	94	89
Vehicle Population	3	3.2	3.4	3.5	3.6	3.8	4.1

Impacts of Interventions on the Air Pollutants

Carbon Monoxide (CO) levels in Ambient Air



Year	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04
Carbon Monoxide	5.45	4.241	4.686	4.183	3.258	2.831	2.581
Vehicle Population	3	3.2	3.4	3.5	3.6	3.8	4.1

AMBIENT AIR QUALITY IN DELHI

Parameter ↓	Percent increase / decrease in 2004 with respect to 2003	
	Area Increase / Decease	
Sulphur Dioxide (SO2)	Residential	0%
	Industrial	(+) 11%
	Traffic Intersection	(-) 11%
Nitrogen Dioxide (NO2)	Residential	(+) 5%
	Industrial	(+) 17%
	Traffic Intersection	(-) 5%
Suspended Particulate Matter (SPM)	Residential	(+) 5%
	Industrial	(-) 4%
	Traffic Intersection	(-) 2 %
Respirable Suspended Particulate matter (RSPM)	Residential	(+) 3%
	Industrial	(-) 4%
	Traffic Intersection	(-) 7%
Carbon Monoxide (CO)	Traffic Intersection	(-) 9%

Parameters	1996	2002	%Change
Vehicles Bus/Taxi/Autos	25 lakhs Diesel/Gasoline	37 lakhs All CNG	+48%
Diesel Consumption*	916 ThMT	1268 ThMT	+38%
Sulphur Content	0.5%	0.05%	-90%
Gasoline Consumption*	406 ThMT	541 ThMT	+33%
Lead Content	0.15 g/l	0.013 g/l	-91%
Benzene Content	5%	1%	-80%
CNG	0	95 MMSCD	+
% Calm	43	41	
HC+NOx (g/km)	3.4	0.57	-83%
CO (g/km)	8.68	2.2	-75%

*** indicates figures for 1995 Vs 2001. (-indicates reduction & +indicates increment)**

AIR QUALITY IMPROVEMENTS IN DELHI

Location	Pollutants	1996	2002	%Change
ITO-Traffic Intersection	SO_2 (µg/m^3)	35	10	-71%
	NO_2 (µg/m^3)	75	75	0%
	CO (µg/m^3)	5587	3258	-42%
	Pb (µg/m^3)	320	103	-68%
Residential Areas	SO_2 (µg/m^3)	16	11	-31%
	NO_2 (µg/m^3)	32	33	+>3%
	Pb (µg/m^3)	176	47	-73%
Industrial Areas	SO_2 (µg/m^3)	21	13	-38%
	NO_2 (µg/m^3)	35	35	0%
	Pb (µg/m^3)	233	68	-71%
Delhi (All Sites)	SO_2 (µg/m^3)	24	11	-54%
	NO_2 (µg/m^3)	47	47	0%
	CO (µg/m^3)	5587	3258	-42%
	Pb (µg/m^3)	213	61	-71%
	SPM (µg/m^3)	426	456	+7%
	RSPM (µg/m^3)	244	185	-24%

All values from CPCB monitoring stations except for RSPM from NEERI stations. *(- indicates reduction & + indicates increment).*

1996 onwards various action taken.

Contd...

KOLKATA - ACTIONS TAKEN

- Stricter location policy for new industrial units restricting setting up of polluting industries (red Category) in municipal area of KMA.
- Ensuring regulatory compliance for grossly polluting industries.
- Introduction of stricter emission standards for boilers, ceramic kilns, foundries and rolling mill of KMA and mandatory use of clean fuels.
- Introduction of Euro-I norms for all new private vehicles.
- Bharat stage-II norms for all new four wheeled passenger cars.
- Ban on supply of loose 2T oil and Improvement in the fuel quality. Unleaded petrol was made available. Up-gradation of emission testing centers.
- Sulphur content in petrol and diesel reduced to 0.05 % and Benzene content in petrol reduced to 3 % .
- Gasoline blended with 5 % ethanol mandatory.
- Regularly complying industries are felicitated with environmental excellence awards
- M/s Coal India Ltd., M/s eastern Coal Field Ltd., M/s Bharat Coking Coal Ltd., have been requested not to supply coal to the industries which have been ordered to discontinue the use of coal.
- About 67% of the coal fired boilers & about 73% of the coal fired ceramic kilns have already been converted to oil fired

KOLKATA-ACTION PROPOSED

Industries

- Scheme for compliance of emissions standards for new Cossipore Generating Station. Electrostatic precipitators will be erected in all the six boilers in a phased manner.
- West Bengal Pollution Control Board has notified stricter emission standards than national standards for particulate matter emission in small scale industries operating coal fired boilers, coal fired ceramic kilns, coal fired hot rolling mills and small cast iron foundries etc.
- Future action plan under Corporate responsibility for environment protection for highly polluting industries. Emission norms for new diesel engines for genset application.

Vehicles:

- Bharat stage-III & Bharat stage-IV emission norms will be implemented for new vehicles (except 2 & 3 wheelers) from 2005 & 2010 respectively.
- For 2& 3 wheelers Bharat –II & Bharat stage-III emission norms will be introduced by 2005 & 2008/10 respectively.
- Sulphur in diesel will reduced to 0.035% & 0.005% by 2005 & 2010 respectively.
- Inspection & maintenance system for all categories of in-use vehicles will be introduced.
- New PUC checking system will be introduced for all categories of in-use vehicles.
- Augmentation of mass transport system by April 2004.
- Stricter emission norms will be made applicable for inter-state buses and trucks.
- Switch over to LPG as automotive fuel in all the vehicles or compliant to Bharat stage-II.
- No PUC – No petrol policy will be implemented.
- Time bound phasing out programme of older vehicles.
- A working group has been constituted for recommending action plan for switch over of 2 wheelers, 3 wheelers & motor vehicles operating in Kolkata to LPG/CNG.
- In accordance with orders of Hon'ble Supreme court a time bound scheme for switching over to LPG mode has been proposed. Establishment of evenly distributed network of at least 75 dispensing stations.

BANGALORE: ACTIONS TAKEN

- Task Force for control of Air Pollution in Bangalore city set up under the chairmanship Additional Chief Secretary to Government of Karnataka.
- To reduce traffic congestion, 108 roads converted to one-way, 5 flyovers, 3 railway under pass on outer ring road and 2 railway over bridges completed. 206 km of road asphalted .
- Green Diesel and Green petrol (Sulphur 0. 05%) is supplied in Bangalore ORR area from 1.4.2003.
- Out of 70,731(as on 31.07.2003) auto rickshaws registered in Bangalore city. 35,000 auto rickshaws are running on LPG with unauthorized LPG kits and detachable cylinders.
- 64 auto rickshaws fitted with authorized LPG kits & 6 Auto LPG dispensing stations (ALDS) with an average off take of 5.0 kl/month are operating in the Bangalore city.
- Transport Department has approved Bajaj 4 Stroke (rear engine) LPG auto rickshaws in Bi – Flue mode on 25.01.2003.
- State Level Steering Committee on development of bio – fuel constituted on 16.07.2003 under the chairmanship Additional Secretary and development Commissioner.
- Supply of 5% ethanol blended petrol started & 219 web camera based PUC centers installed for better PUC tests of vehicles.

BANGALORE-ACTION PROPOSED

- Mandatory conversion of in-use 3 wheelers to bi-fuel mode in a phased manner.
- Registration of only new 3 wheelers having bi-fuel mode.
- Conversion of nearly 35,000 Auto rickshaws running with unauthorized LPG kits and detachable cylinders by October 2005.
- Introduction of " No PUC Certificate –No fuel" scheme in petrol/diesel bunks by 2004
- Mandatory setting up of Electronic emission testing centers in each petrol bunk from 1.11.2003 onwards.
- BMTC to replace its fleet with Bharat stage-II compliant vehicles.
- Augmentation of the services by BMTC by 17 % by increasing fleet size from 3106 buses at present to around 4330 by end of October 2005.
- Increase sales tax and to impose entry tax on white kerosene (Superior Kerosene Oil) to curb adulteration with petrol.
- Strengthen vigilance and surveillance to check adulteration of fuels.
- Mandatory self registration of kerosene wholesalers and production of end use certificates before Civil Supplies Department.
- Karnataka State Pollution Control Board to take action to promote cleaner fuels in major industries in DG sets and boiler.

AHMEDABAD-ACTION TAKEN

- Government has constituted a Task Force under the Chairmanship of the Chief Secretary to implement the recommendations made.
- To check adulteration of petrol with gasoline in vehicles, the transport department has already started the drive to check the fuel adulteration. 522 such cases were found during July to Dec' 02.
- Drive on checking of vehicles for PUC and fuel adulteration has been intensified in a coordinated manner. Various agencies including GPCB, Traffic Police, RTO, FSL were involved.
- The FC& CA Dept has initiated various actions to ensue that no loose kerosene is sold in the vicinity of petrol pumps.
- The GPCB has already intensified monitoring of air samples from various industries to verify compliance with specified norms along with ambient air quality monitoring.
- GPCB has given necessary instructions to all the industrial estates in the city for the development of green belt all along the periphery.
- The GPCB has already initiated various actions for the implementation of the " Charter on Corporate Responsibility" in Gujarat for the industries.
- GSPC has already initiated various actions for the implementation of CNG project and establishment of CNG network in the state with the total investment of Rs. 650 Crores (250 Crores for Ahmedabad).

AHMEDABAD-ACTION PROPOSED

<u>Vehicular(Short Term Measure)</u>

- Phasing out of old vehicles of more than 15 years by 31/12/2005
- Intensifying implementation of ban on 2 T Oil at petrol stations/ service garage.
- Diversions of heavy vehicles such as trucks/luxury Buses/etc away from the city & better traffic management.
- Strict enforcement of smoke test/vehicle test protocols and third party audits of PUC centers including calibration audits.
- To launch a drive to stop adulteration of fuels particularly in 3-wheeler & CVs.
- Only Bharat stage-II compliant vehicles will be registered .
- Strengthening of Ambient Air Quality Monitoring network.

<u>Medium term measure:</u>

- Flyover to be provided at highly congested traffic areas .
- Government of Gujarat has constituted a committee for the identification of plots for CNG/LPG fuelling stations in AMC and AUDA limits. AMS and AUDA have agreed to reserve such plots.

<u>Industrial (Short term measures)</u>

- Intensifying monitoring by special vigilance squad under the Air Act, 1981.
- Determining efficacy of Air pollution control systems and taking remedial action(s) including up gradation of the existing APC measures.
- Implementation of CREP action plan for highly polluting industries as decided by MoEF.
- Ban on burning of garbage /dry leaves/PVC bags/other packaging material within the industrial estate.

HYDERABAD-ACTION TAKEN

- Five Mobile Task Forces has been constituted to look after various issues related to implementation of action plan.
- The number of Ambient Air Quality Monitoring Stations have been increased from 9 to 21stations.
- PUC certificates to all 3 & 4 wheelers have been made mandatory. Up gradation of PUC centers for petrol and diesel.
- 122 Polluting Centers are computerized in the city.No-Fuel without PUC.
- 280 pre-mixed 2T Oil dispensing stations have been installed & 2 task forces are operating to check the adulteration of fuel.
- Six LPG dispensing stations are operational out of targeted 45 stations. 23 plots have been identified for setting up multi fuel dispensing station.
- Improvement in the fuel quality.
- Multi Model Transport System to improve mass transportation system has been introduced.
- Various mass awareness programmes organized.

HYDERABAD-ACTION PROPOSED

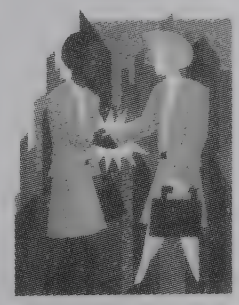
- Euro-II norms will be applicable to all new 4 wheeled vehicles of 3.5 tonnes and below.
- Bharat stage-II norms will be applicable for all new buses/ goods vehicles by April 2005.
- Bharat stage-II norms will be applicable for all new 3 wheelers with immediate effect.
- All in-use petrol driven 3 wheelers to be converted to LPG by October 2005.
- Phasing out of heavy goods carriers of +15 years by October 2005.
- All petrol taxis to be converted to LPG by October 2004.
- Taxi permits not to be issued for vehicles above 10 years.
- Setting up of LPG dispensing stations in HUDA area.
- To augment existing pre- mixed 2T oil petrol outlets & number of PUC centers.
- APSRTC has proposed to convert 538 buses to Euro-I norms every year till 2005 for plying in HUDA limits.
- The Gas authority of India Ltd. , has assured that laying of pipelines from Vishakhapatnam to Hyderabad & within this period LPG dispensing stations should be established in HUDA area. Conversion of two, three and four wheeled vehicles to LPG or dual mode would be encouraged.

ACTION PLANS-COMMON ISSUES & GAPS

- Most of the city action plans emphasize automobile pollution as major air pollution source which may not be the case for all the cities (eg. - Jharia, Faridabad, Jodhpur etc.)
- Excessive stress for vehicular pollution control downplays the potential of other probable city specific or local sources.
- Source apportionment & emissions inventory from all possible sources need to be carried out for identification of potential sources and for formulating effective action plans.
- All states indicated augmentation of air quality monitoring stations however, issues pertaining to compulsory auditing of stations including calibration of analysers, calibration gas and spare part availability, data handling & dissemination require specific attention.
- Automobile pollution control measures as included in the action plans may necessarily align to the Auto-Fuel Policy recommendations & directions. The common aim for switching over to CNG mode as indicated in the plan may not be practically feasible for all the cities and in this case options for exploring other alternatives may be worked Out.

CONCLUDING REMARKS

- Indoor air pollution is more critical in India compared to outdoor pollution
- Occupational health issues specially at Small Scale Industries are critical due to high air pollution at work zone area.
- In major cities air pollution due to in use vehicles specially 2 stroke vehicle are high.
- In Chemical Industrial Zones in Maharashtra and Gujarat, Hazardous Air Pollutants (HAP) are significantly high.
- Human Risk analysis should be initiated at non attainment areas.
- Air Quality Standard / Guidelines for HAP / POP should be developed urgently.
- Continuous Air Quality including on line data transmission in Web Site / Public display should be given priority.
- Epidemiological Studies should be conducted at all critically polluted areas / major industrial zones.



THANK YOU

Speaker : Ramana Dhara, *Adjunct Professor, Rollins School of Public Health, Emory University, Atlanta* — Asthma surveillance and intervention programs

Asthma Surveillance & Intervention programs

V. Ramana Dhara, MD, ScD
Adjunct Professor, Rollins School of Public Health of Emory Univ., Atlanta, GA
vdhara@emory.edu

Surveillance: what is it?

- Police vs. public health surveillance!
- Who? When? Where?
- Collection, analysis, interpretation & dissemination of data

Surveillance: what can I do with it?

- Calculate incidence & prevalence
- Incidence: # of new cases in a given time period
- Prevalence: total # of cases

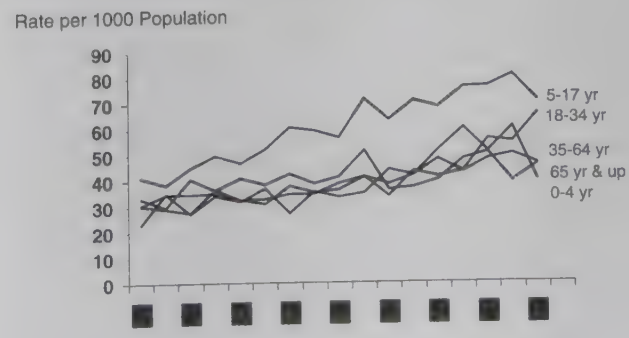
Surveillance types

- Active: initiate procedures to obtain reports; e.g. visit doctors & hospitals, telephone surveys
- Passive: leave the initiative for reporting to others
- Important to define how it is done, who is contacted, & frequency of contact

Sources of Data

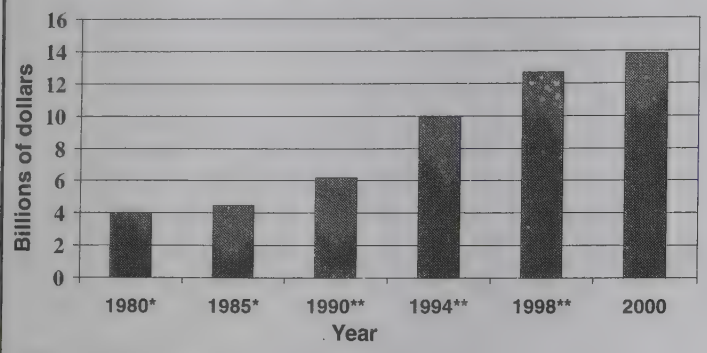
- National Health Interview Survey (NHIS)
  - Self-reported prevalence and activity limitations
- National Hospital Ambulatory Medical Care Survey (NHAMCS)
  - Emergency Department (ED) visits and admissions
- National Vital Statistics
  - Mortality
- Behavioral Risk Factor Surveillance System (BRFSS)
  - State-based self-reported prevalence and activity limitations

Asthma Prevalence* by Age US, 1980-1996



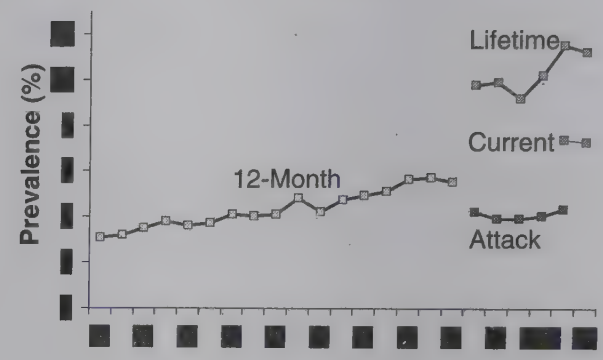
Source: National Health Interview Survey
* 12-month prevalence

Costs of Asthma
United States, 1980–1998
Projection for the Year 2000



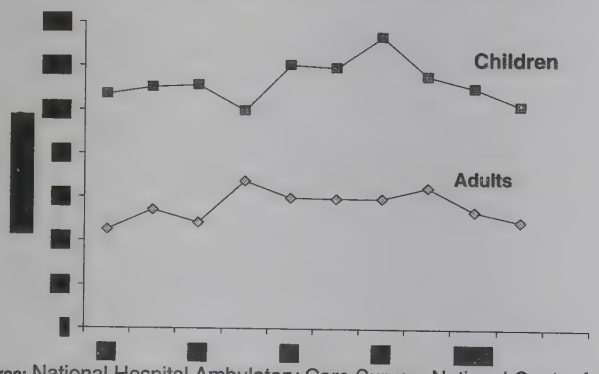
Source: * Weiss, et al. 1992 ** Weiss, et al. 2001

Asthma Prevalence, US,
1980-2002



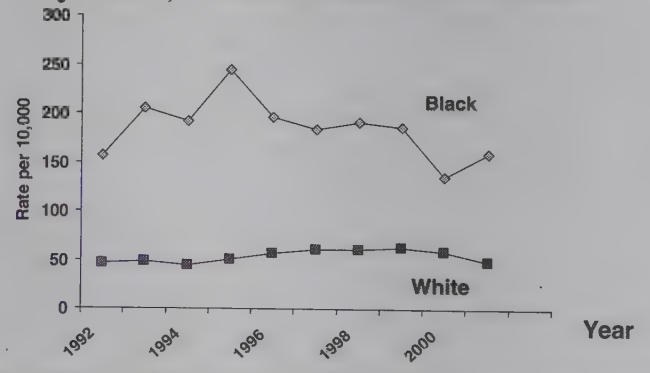
Source: * National Health Interview Survey

Adult and child asthma emergency department rates, United States: 1992–2001



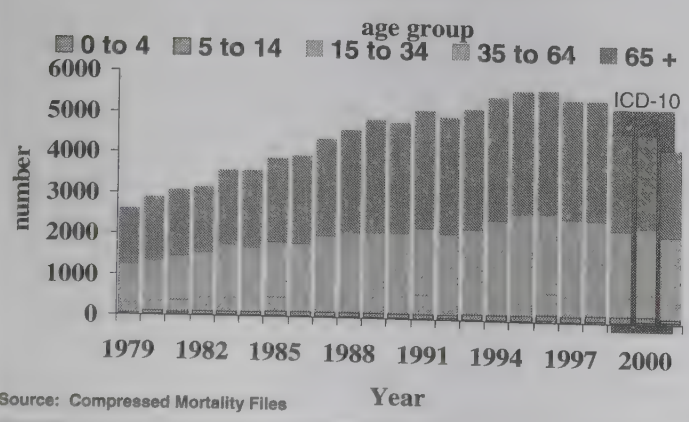
Source: National Hospital Ambulatory Care Survey; National Center for Health Statistics

Asthma* Emergency Department Visits# by Race, United States: 1992–2001



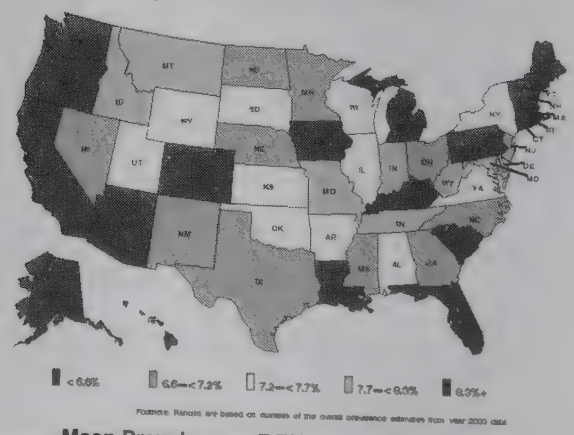
Source: National Hospital Ambulatory Care Survey; National Center for Health Statistics
* First-listed diagnosis # Age-adjusted to 2000 U.S. population

Deaths Due to Asthma, United States, 1979-2001



Source: Compressed Mortality Files

Current Asthma Prevalence Rate (%) by State, BRFSS 2003



Mean Prevalence = 7.7% , range: 7.5 – 7.9%

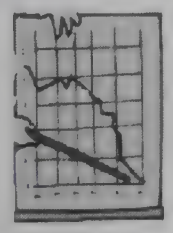
Summary trends of asthma, US

- Prevalence, health care use, and mortality increased through mid 1990s
- Since mid 1990s, prevalence, ambulatory health care use, hospitalization and death rates have plateaued
- Minority bear a higher asthma burden
  - Racial disparities most pronounced for preventable outcomes, such as ER visits, hospitalization and death

Aim of CDC asthma program

Reduce the burden of asthma through better application of current knowledge of medical and environmental management

- Reduce death rate, hospitalization rate, ED visit rate, missed school and work days, activity limitation
- Improve adherence to NAEPP guidelines
- Improve tracking capability (www.healthypeople.gov)



CDC's asthma program

- Surveillance
- Implement scientifically proven interventions
- Partnership / Training

Call to Action

- Partnership
  - Synergy
  - Information sharing
  - Coordinated response
- Strengthen science
  - Relevant
  - Practical
  - Integrated

The Next Step: What You and I Can Do

- Look for research and outreach opportunities to make the science as clear
- Intervene/ offer expertise based on the best science

What You Can Do

- Ask the right questions/ give recommendations
  - Help patients determine the triggers that might contribute to their asthma
  - Suggest ways to prevent asthma exacerbations by taking the appropriate medications properly, and avoiding/decreasing environmental allergens
- Practice what you preach !
  - Quit Smoking and decrease ETS exposure

CHILDREN'S ASTHMA
Mumbai, 14-15 June 2005

Pediatric Environmental Health Specialty Unit (PEHSU)

- Network of units across the U.S.
- Improve kids health thru education, collaboration, research, env health services & technical assistance

PEHSU Goals

- Improve health of kids by reducing environmental health hazards
- Improve access to expertise in pediatric environmental medicine
- Inform families, communities, agencies and health care providers about environmental health hazards and ways to protect health

PEHSU work

- Consultation, training & referrals on environmental health issues
- Promote environmental health in communities

- Develop materials, provide information, educational activities for families, agencies & health care providers

PEHSU work

- Provide clinical pediatric environmental health services: patient evaluation, treatment & referral to network of expert clinicians

- Conduct research

- www.sph.emory.edu/PEHSU

Asthma Resources

- www.cdc.gov/nceh/airpollution/asthma
- www.nhlbi.nih.gov/about/naepp
- www.aanma.org
- www.cdc.gov/nceh/airpollution/links.htm
- www.aafa.org
- www.aaaai.org
- www.nationaljewish.org

Speaker : Vijay Kanhare, *Occupational Health and Safety Centre, Mumbai* —
Community perception of impediments to mitigating air pollution - related health effects

Community's perception of impediments to mitigating air pollution-related health effects

Vijay Kanhare
Occupational Health and Safety Centre, Mumbai (OHSC)
www.ohscmumbai.org
(Established in 1988)

Environment

- Environment WITHIN workplaces/factories is also environment.
- We do not restrict environmental problems to problems due to vehicular pollution, effluents and cooking fuel fumes and so on.

Many workers suffer due to exposure at work

Yet doctors rarely diagnose it as Workplace Environmental Asthma or Occupational Asthma.

Problems in Public Health System and the ESIS

- Recording of History hastily done
- Problem with lung function tests and interpretation

Diagnosis of Occupational Asthma avoided

We see comments such as

- Symptom of breathlessness exacerbated due to work exposure
- Avoid exposure to cotton dust
- Bronco-dilators prescribed

Final comment

No Occupational Disease

Evaluation of Disability

Lung Function Test Readings
FEV1
#FVC
#FEV1/FVC
Comparison with Predicted Values
are important components

How to Find Predicted Values?

`Inbuilt in imported machine(!)'

`Facility to change equations'

What are the equations those are inbuilt?

Predictions

Depend on

*Age, sex and height

#there are ethnic corrections in equations developed in northern countries

Indian Efforts

- Equations developed by

*Dr S R Kamat et al

*Dr. Udvadia

*National Institute of Occupational Health

has developed different equations for different Indian states

RADS—Reactive Airways Dysfunction Syndrome

- This was reported in IPT organized by local groups, ICHRL and CSA Desk

A 10-month-old baby

- exposed to heavy dose of chlorine in July 2004, in Mettur Dam area of district Salem, Tamil Nadu.
- Till May 2005 his problem persisted and must be persisting yet.
- The description of the symptoms pointed to RADS.

Difficulties

- Parents are finding it very difficult to get proper treatment for the child.
- Initially the Company that leaked chlorine paid five thousand rupees
- Later even denied that leak occurred from their facility.
- The father is a construction worker and the family finds it very difficult with this problem.

Family unaware about

Right to receive cost of treatment

under the

Public Liabilities Insurance Act

Speaker : Ameesha Mehta-Sampath, *Environmental Protection Agency, New York* —
Addressing the Childhood Asthma Epidemic in New York City—A Mega-City

Addressing the Childhood Asthma Epidemic in New York City- A Mega-City

Ameesha Mehta-Sampath, M.PH.
US EPA-Region II

International Workshop on Environmental Health-Children's Asthma
Sharing community-based intervention experiences and solutions between two mega-cites: Mumbai and New York City
June 14-15th , 2005

1

What is Environmental Health?

- Promoting health or the quality of life by preventing or controlling diseases or death that can result from interactions between people and the environment.
- Requires us to focus on the nexus between the health and environmental indicators.

2

WHO's Macroeconomics and Health Proceedings: Investing in Health for Economic Development

- Education is widely recognized as a key to economic development, but many fail to appreciate how important childhood health, including environmental health, is for educational attainment. Poor health directly reduces cognitive potential and indirectly undermines school absenteeism, insufficient attention to lessons and early dropouts.

3

GINA: the Childhood Asthma Epidemic

- ***Estimates that as many as 300 million people of all ages, and all ethnic backgrounds, suffer from asthma & the burden of this disease to governments, health care systems, families, and patients is increasing worldwide.***
- *The Global Initiative on Asthma (GINA): WHO & NHLBI/NIH. To raise awareness among public health, government officials, health care workers, and the general public that asthma was on the increase.*
- ***Global Burden of Asthma Report***: 2003-2004 during World Asthma Day (first Tuesday in May)

4

The Childhood Asthma Epidemic in the U.S.

- Asthma is the most common chronic childhood disease, affecting 6.3 million children. *American Academy of Allergy, Asthma and Immunology.*
- Nearly 1 in 13 school-aged children has asthma, and the rate is rising more rapidly in preschool aged children than in any other age group. *US Dept. of Health and Human Services.*
- Approximately 4.2 million children had an asthma attack in the last year. *Centers for Disease Control & Prevention*
- Asthma in children is the cause of almost 5 million physicians visits and more than 200,000 hospitalizations per year. *Centers for Disease Control & Prevention, National Center for Environmental Health.*
- Asthma is the leading cause of school absenteeism from a chronic childhood condition: 14 million school days are missed each year due to asthma. *Centers for Disease Control & Prevention, National Center for Environmental Health.*

5

The Childhood Asthma Epidemic in India

- WHO: India has an estimated 15-20 million asthmatics.
- In India, rough estimates indicate a prevalence of between 10% and 17% in 5-11 year old children. Estimates do not reflect prevalence in the many homeless/street children in India.
- GINA's Global Burden of Disease Report: rapid industrialization and urbanization = more asthma cases.
- The increase is likely to be particularly dramatic in India, which is projected to become the world's most populous nation by 2050.
- An absolute 2% increase in the prevalence of asthma in India = additional 20 million people with the disease.

6

What Does the Childhood Asthma Epidemic Cost the U.S.?

Annual Expenditures for health and lost productivity due to Asthma were $14 billion in 2002. *National Heart, Lung and Blood Institute 2002 chart book.*

7

What Factors Affect Asthma?

- Many factors exacerbate asthma. The strongest risk factors for developing asthma are exposure, especially in infancy, to air pollution, particularly traffic-related pollution.
- Diesel emissions are one of the most significant sources of harmful pollutants that are damaging to a child's respiratory health resulting in exacerbations of existing allergies and asthma symptoms. *EPA's Health Assessment Document on Diesel Exhaust.*
- Yale study of children exposed to indoor air pollutants from diesel exhaust while traveling in school buses: PM 2.5 measured on diesel buses were often 5-10x higher than average levels measured at the 13 fixed-site PM 2.5 monitoring stations in Connecticut. *Wargo, John, Children's Exposure to Diesel Exhaust on School Buses. Environment and Human Health, Inc. February 2002.*

8

What Factors Affect Asthma?

- Indoor pollutants resulting from burning of biomass fuels for cooking and heating. EPA's *Partnership for Clean Indoor Air: www.PCIAonline.org*
- Indoor allergens (such as domestic mites in bedding, carpets and stuffed furniture, pets, mold and cockroaches).
- Exposure to tobacco smoke and exposure to chemical irritants.
- The weather (cold air), stress and physical exercise can exacerbate asthma.

9

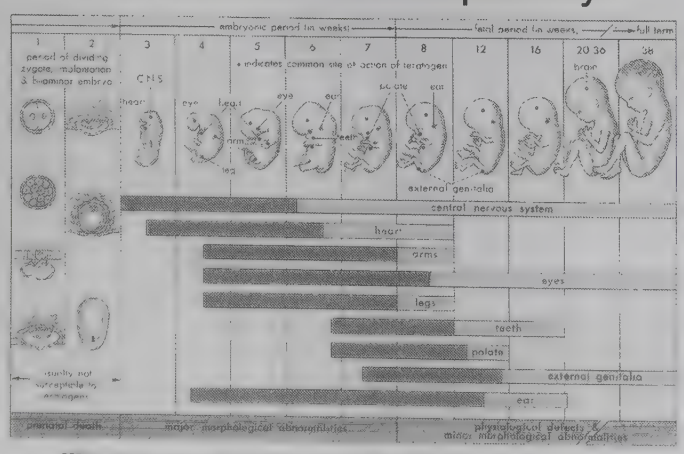
Children Are Not Little Adults

Windows of Susceptibility in Development | **Differences in Physiology** | **Differences in Behaviors**

Children's Increased Vulnerability

10

Windows of Susceptibility



RED/dark is highly sensitive period, YELLOW/light for less sensitive period.
From Before We Are Born: basic embryology and birth defects. Keith L. Moore. 1989. W.B. Saunders Co. via Selevan et al., *Environmental Health Perspectives*, Volume 108, Supplement 3, June 2000

11

Differences in Physiology

- Children's bodies are different
- Respiratory and nervous systems are still developing.
  - Children breathe in more air than adults, inhaling almost 2x as many pollutants.
  - 80% of lung development in children occurs post-natally & changes in lung continue through adolescence.

12

Differences in Physiology...

- At age 4, the # of alveoli in the human lung increases from 24 million at birth to 257 million.
- Lung epithelium is not fully developed; thus greater permeability of the epithelial layer in young children to pollutants.
- Developing systems are less able to detoxify and excrete these pollutants compared to adults. *Ambient Air Pollution: Health Hazards to Children, Committee on Environmental Health, American Academy of Pediatrics, 12/16/04*

- Children ingest more fluids proportionately than adults.
- Dermal absorption is greater –more surface area of skin relative to weight.

13

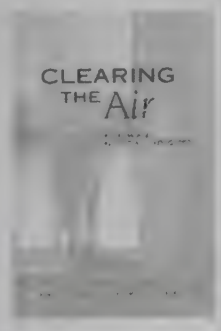
Differences in Activity

- Children's activities are different.
  - They spend more time outdoors.
  - They play outdoors when the ozone and particulate pollution is the greatest.
  - Hand to mouth contact is more frequent, exposing them to toxins through ingestion

14

Asthmagens & Factors that Exacerbate Asthma

- National Academies/IOM Report *Clearing the Air: Asthma and Indoor Air Exposures* (EPA), 2001
  - **Current knowledge sufficient for action**
  - Identified future research needs



- Less than 50% of asthma patients say that a physician mentioned environmental management
- Addresses health benefits resulting from recommended environmental interventions.

15

Studies on Air Pollution Effects on Respiratory Health of Children

- **The Effect of Air Poilution on Lung Development from 10-18 years of Age.** (Gaurderman, W., et. Al, N Engl J Med (351:1057-1067) 9/9/04)
  - Referred to as the Children's Health Study
- **Traffic-related Air Pollution near Busy Roads: The East Bay Children's Respiratory Health Study.** (Kim, J., et.al, American Journal of Resp. and Critical Care Medicine. Vol. 170.pp. 520-526, 2004).
- **Particle Concentrations in Inner-City Homes of Children with Asthma: The Effect of Smoking, Cooking and Outdoor Pollution** (Wallace, et. al, Environmental Health Perspectives, (111:9) July 2003)

16

Key Results from these studies on Air Pollution and its Effects on the Respiratory Health of Children

Children in more polluted communities have:

- More school absences from acute respiratory problems when ozone levels go up.
- Asthma exacerbation in areas with more traffic-related pollutants.
- More cases of newly diagnosed asthma (in areas with high ozone levels).

17

Key Results from these studies on Air Pollution and its Effects on the Respiratory Health of Children

Children in more polluted communities have:

- Reduced lung function growth (their lungs grow more slowly) as traffic-related air pollution increases.
- Improvement in lung function if they move to a less polluted community.

18

Health Outcomes Associated with Common Air Pollutants

- **Particulate Matter (PM 2.5-PM 10)**
  - Increased mortality risk for infants
  - Developmental problems in children, such as low birth weight
  - Reduced lung function and growth
  - Worsens asthma
  - Increased hospitalization for heart and lung disease and respiratory illness
  - Permanent damage to the immune, reproductive and neurological systems
- **Ground Level Ozone**
  - Lung irritation and inflammation
  - Reduced lung function
  - Cough, chest pain, shortness of breath
  - Reduced ability to exercise
  - Worsens asthma and bronchitis
  - Increased mortality risk
  - Increased hospitalization for heart and lung disease and respiratory conditions

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Health Outcomes Associated with Common Air Pollutants

- **Carbon Monoxide**
  - Reduced capacity of the blood to carry oxygen
  - Reduced capacity to exercise
  - Reduced time to onset of angina pain
  - Neuro-behavioral effects
- **Sulphur Dioxide**
  - Worsens asthma
  - Wheezing, chest tightness, shortness of breath
- **Nitrogen Oxides**
  - Decreased lung function
  - Cough, chest pain, shortness of breath
  - Increased hospitalization for asthma

20

Asthma Prevalence Rates in New York City

- School-based asthma prevalence (13.9%-15%) among 4-5 year old children. More than twice as high among children from low-income areas than among children residing in high-income areas.
- Lifetime prevalence among adults 18 years and older, 12.0%
- In 2000, children in NYC were almost twice as likely to be hospitalized for asthma as children in the U.S. as a whole.
- Although, total hospitalizations decreased by 36% between 1997 and 2000 due to focused interventions, economic costs of asthma totaled more than $242 million in 2000.

21

U.S. EPA-Region II Addressing the Childhood Asthma Epidemic

Mission: To address the asthma epidemic in Region II (NY, NJ, PR, VI) via a holistic manner that involves a three pronged approach:

1) Air Pollution Management
2) Asthma Management
3) Community-based Interventions

22

What is Air Pollution Management?

- *Outdoor Air*

– Monitoring: industrial waste, mobile sources, non-point source emissions, etc.

– Transportation Programs: Public & Private: ULSD, Alternative Fuels, Traffic Control

– Continued studies on the effects of outdoor environmental interventions on asthma morbidity and mortality.

23

What is Air Pollution Management?

Indoor Air

- Schools: Indoor Air Quality Tools for Schools

- In-home asthma intervention programs

- Continued studies on the effects of clinical & indoor environmental interventions on asthma morbidity and mortality.

24

What is Asthma Management?

- *Developing a State-level Asthma Action Plan*
  - Formation of Asthma Coalitions, State & Local
  - Community-based Asthma Action Plan
  - Identify high Asthma prevalence areas via incident data
  - Develop an effective asthma surveillance system that involves the health departments, hospitals, doctors, etc.
  - Medical Management: training of physicians, nurses, respiratory therapists, social workers, school nurses, community health workers, etc.
  - Advocacy

25

What are Community-based Interventions?

- *Participation of Community organizations in the Asthma Coalition*
  - Assisting in the implementation of asthma trigger management in homes & schools.
  - Increasing awareness of the asthma epidemic in the community.
  - Effective grassroots organizing which results in holding gov't agencies and other organizations accountable.
  - -- Assisting in collecting data on asthma morbidity before & after interventions.

26

What are Community-based Interventions?

- *Participation of Community organizations in the Asthma Coalition, con't*
  - Increasing awareness of the appropriate Medical Management for asthma.
  - Increasing the use of the asthma management plan.
  - Advocacy

27

Key Results From Community-based Interventions Among Children with Asthma

- Resulting in reduced asthma-associated morbidity including, less emergency room visits; less missed school days; less hospitalizations, and increased symptom-free days.
- By combining indoor & outdoor environmental interventions with proper clinical interventions: Very significant improvements in asthma-morbidity and mortality.

28

Other Key Accomplishments in New York City?

- Two Regional Asthma Summits (Oct. 2000, Oct. 2001) that brought together appropriate organizations & gov't agencies to develop an action plan and timeline.
- By forming an Asthma Coalition-the New York City Asthma Partnership (NYCAP) which covers all of New York City (5 boroughs).
- NYCAP is a city-wide asthma coalition whose members include representatives from local asthma coalitions, state, lcal and federal gov't agencies, academia, community-based organizations, political offices, hospitals, social service agencies and others.

29

How Do We Define an Asthma Coalition?

- An ***asthma coalition*** is a collaborative group of medical and public health professionals, business leaders, government agencies (education, transportation, health, environment, housing, etc.), social service agencies, academia, children's groups, community activists, and others dedicated to improving the quality of life for people with asthma through implementation of programs geared to reducing the prevalence of asthma triggers, information sharing, networking and advocacy.

30

What is working in New York City?

- Initiatives focused on addressing outdoor environmental pollutants:

- use of alternative fuels; cleanup or retrofit of existing bus fleets (public buses and school buses).

- creating asthma free zones: reduction of idling buses, cars, etc., near sites where children play and go to school.

- Initiatives via asthma coalitions to implernent programs that educate families and their children about indoor environmental triggers & how to manage them effectively.

31

What is working in New York City?

- Initiatives focused on training health care providers about environmental triggers, both indoor and outdoor. Training focuses also on appropriate standards of care for asthma.
- Addressing indoor air quality in schools, including training school nurses, school facilities managers, teachers, etc.
- Developing social marketing approaches to empower families to manage their child's asthma properly.
- Implementing an asthma surveillance system that tracks & maps specific indicators to assess the high prevalence areas and assist the coalition in targeting the high priority areas.

32

Lessons Learned: What has not worked in NYC?

- Initiatives that have focused on addressing either indoor or outdoor environmental pollutants, not both.
- Or initiatives that are focused on addressing medical issues and not environmental issues. KEY: we need to include both.
- Not involving the community and getting their buy-in early on in the process. To have a sustainable, effective and measurable program as well as increase their trust of gov't programs, they need to be included at the beginning.

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Lessons Learned: What has not worked in NYC?

- Additional outreach from state to local and community level is needed to better utilize the Air Quality Index System.
- Ongoing Goal: Better coordination in implementation and evaluation between the organizations responsible for implementing the 3 pronged approach:
- Air Pollution Management
- Asthma Management
- Community-based Interventions

34

EPA's AQI System

- Until the country meets its clean air goals, you can take ***simple steps to protect yourself*** from particle pollution.
- ***Get in the habit*** of checking your local ***Air Quality Index forecast*** **every day**.
- When particle pollution levels are predicted to be high, ***change your plans*** to reduce the amount of pollution that gets in your lungs.

AQI
AIR QUALITY INDEX
50 100 150 200

AQI forecasts tell you whether particle levels are expected to be high – and suggests steps you can take to protect yourself.

Those steps vary, depending on whether you're in one of the groups more at risk from particle exposure.

35

The Air Quality Index:

Air color code	Who is affected?	What is the significance?	What action should people take?
Green		Air quality is good	Enjoy activities
Yellow	People who are unusually sensitive to air pollution	Air quality is a concern for people who are unusually sensitive to air pollution	**People unusually sensitive to air pollution:** Plan strenuous activities when air quality is better
Orange	People with heart or lung disease (including asthma), older adults, and children	Air quality is unhealthy for people in sensitive groups	**Sensitive groups:** Cut back or reschedule strenuous activities
Red	Everyone, especially people with heart or lung disease (including asthma), older adults, and children	Air quality is unhealthy for everyone	**Everyone:** Cut back or reschedule strenuous activities **Sensitive groups:** Avoid strenuous activities
Purple	Everyone, especially people with heart or lung disease (including asthma), older adults, and children	Air quality is very unhealthy for everyone	**Everyone:** Reschedule or cut back on strenuous activities **Sensitive groups:** Avoid all physical activities

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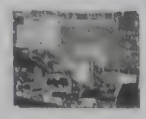
Why Forecast Air Quality?

- *Protect public health*
  - Allows the public to plan activities that avoid exposure
  - Allows sensitive individuals to plan activities and healthcare
- *Effectively run a voluntary emissions reduction program*
  - Participation depends on forecast accuracy and timeliness
  - Affects the public's activities
  - Affects sponsor or donor agency support



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Why Forecast Air Quality?

- *Conduct special sampling*
  - Allows sufficient time to prepare monitoring equipment and personnel
  - Lets researchers sample pre-episode conditions

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Mega-Cities: Mumbai & New York City: A Partnership Approach to Address Asthma

Besides population (Mumbai 16.5, New York 16.8), how else are we similar?

- Experience humid, hot climates in the summer.
- Both have high asthma rates in children & other respiratory health issues.
- Populations are multi-cultural, multi-lingual and have certain level of awareness of asthma and air pollution.
- Extensive public transportation networks; experience high vehicular emissions & other transportation-related challenges.

39

Mega-Cities: Mumbai & New York City: A Partnership Approach to Address Childhood Asthma.

- Currently, implementing clean fuel or alternative fuel projects.
- Organizations are involved in raising awareness about asthma at the community level.
- Financial capitals of their respective countries.

Seed Funding to Cerena Foundation: To organize a workshop with the assistance of key partners, to further explore this partnership and develop a community-based action plan. Mumbai, June 2005.

40

What is a Mega-City?

- UN defines mega-cities as cities over 10 million people; in 2015, the UN estimates that there will be 23 mega-cites around the world.
- As of 2001, Population of Mumbai 16.5 New York 16.8
- In 2015, population of Mumbai to reach 22.6, and in New York 17.9.
- **Urbanization appears to be correlated with significant increase in asthma.**

41

New York City

- 56% of our approximately 2 million children in the city have at least one foreign born parent.
- Immigrant children suffer disproportionately from an array of environmental health problems.*
  - Asthma
  - Lead poisoning
  - Complications from pesticide exposure

*Source: New School University, Milano Graduate School, January 2004

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Mega-Cities: Mumbai & New York City: A Partnership Approach to Address Asthma

Goals of this approach:

- To implement community-based programs by building capacity in NGO's and civil society that educates and mitigate exposures to air pollution;
- To foster an inter-disciplinary/holistic approach that inter-connects the various components involved in promoting children's environmental health that is tracked over time;
- To share examples of good practice in implementation strategies; lessons learned in projects promoting healthy transport; clinical and environmental interventions in asthma;
- To facilitate how cities can work collaboratively on a multi-cultural level towards health and the environment---promoting transport policies & improving children's environmental health.

43

Importance of a Partner-City Approach

- Environmental health issues need to be addressed globally for all children to thrive.
- Domestically public health needs to be attuned to the unique needs of our immigrant children (language, poverty, poor housing and cultural practices).
- We all live in an increasingly borderless world. Necessity to share information.

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Contact Information

Ameesha Mehta-Sampath, M.PH.

Asthma Projects Coordinator
US Environmental Protection Agency
Region 2
Radiation and Indoor Air Branch
290 Broadway, 26th Floor
New York, NY 10007
212 637-4006 (phone)
212 637-4942 (fax)
Mehta-sampath.ameesha@epa.gov

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Plenary Session 5 :
Asthma Intervention Programmes

Chair : T K Joshi
Head, Centre for Occupational and Environmental Medicine
Delhi

Speaker : Sapna Pandya, *Center for immigration health, New York University School of Medicine*
— Lessons from South Asian community-based intervention programs in New York City

Lessons from South Asian community-based intervention programs in New York City

Sapna Pandya, M.P.H.
Jyotsna Changrani, M.D., M.P.H.
South Asian Health Initiative (SAHI)

CENTER FOR Immigrant Health NYU School of Medicine

CENTER FOR THE STUDY OF ASIAN AMERICAN HEALTH

Center for Immigrant Health

- Established in 1990 as the New York Task Force on Immigrant Health
- A partnership of community members, health care professionals, researchers, social scientists, policy makers & advocates
- Facilitates the delivery of epidemiologically informed and culturally & linguistically sensitive health services

CENTER FOR Immigrant Health NYU School of Medicine

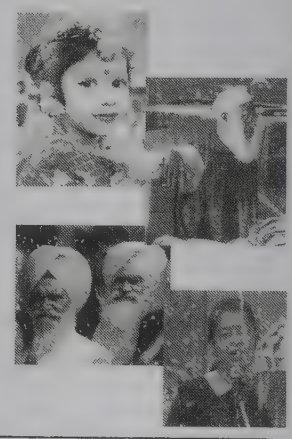
Center for the Study of Asian American Health

- Received funding from NIH in 2003
- Dedicated to health of Asian Americans
- Research, Training, Outreach, Administrative cores

CENTER FOR THE STUDY OF ASIAN AMERICAN HEALTH

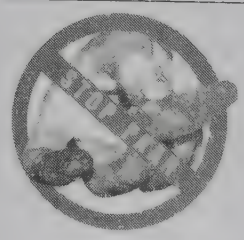
South Asian Health Initiative (SAHI)

- What is SAHI?
  - **Research, outreach & education, information dissemination, program/policy development**
- Past/Current Projects:
  - STOP PAAN
  - CTTP
  - SACHNA
- Future Activities



STOP PAAN

Smokeless Tobacco
Oral Pathology
Prevention & Awareness
Network



- Objective & Purpose
- Strategy for Intervention
  - Community screenings: FBOs, labor groups
  - Media (coverage & networking)
  - Development of educational materials: Flip books, quiz, brochure, posters
  - Development of oral health screening and referral network

How do we do this?

To detect oral cancer in early stages and link those with positive findings to appropriate services, thereby reducing the mortality associated with delayed detection, as is commonly seen in the community.
Organize community screenings
Bicultural, bilingual dentists and/or students

• Therefore,

Identify, recruit, train individuals to perform screenings; incorporate existing resources at NYU (NYU Dental, NYU Indian Dental Students Association, NYU South Asian Medical Students Association, etc.)

Build community rapport, linkages with key community leaders, members

Building community rapport

-Know your landscape (what skills at your disposal?), map your community
-Check your assumptions at the door
-Visit, walk around, see the people
-Where do people pray, eat, shop, live, work, study, visit?
-Make initial contact --- phone, in-person
-Chat, share personal traits
-Emphasize BENEFITS of intervention
-Explain what THEY can give in return
-Should be working in COLLABORATION not one for the other
-Maintain relations even after event or intervention

How do we do this?

To increase awareness about the risk of cancer posed by *paan* and *gutka* in the South Asian immigrant communities in New York City. Increased awareness will serve as the first step in primary and secondary prevention of *paan* and *gutka* chewing, including harm reduction.

→ ***Culturally and linguistically appropriate educational material to be disseminated***

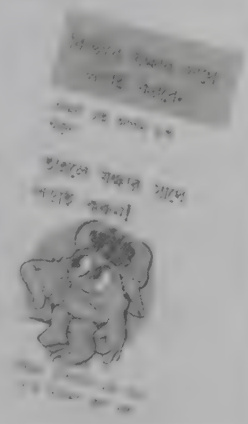
→ ***Culturally and linguistically appropriate social media campaign utilizing community media (TV, radio, print)***

→ ***Conducting community-based educational workshops tied into screening events***

- **Therefore,**

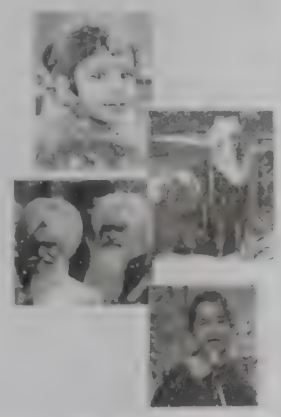
→ **STOP PAAN material development component**

Community Tuberculosis Prevention Program (CTPP)



- Objective and Purpose
- Strategy for intervention
  - Place of work: "Lexington Avenue Outreach", taxi workers
  - FBOs: mandir, masjid, gurudwara
  - SIP (DOT)
  - Translation of materials
- Challenges and Collaboration

South Asian Community Health Needs Assessment (SACHNA)



- Objective(s)
- Methodology
- Role of SAHI Board

Asthma and South Asians

Prevalence in US?

- India - Delhi school-based study of almost 20,000 revealed 11.9% prevalence: male sex, family history & presence of smokers are factors; SEC, air pollution, kitchen fuel were not. (Chhabra, *Annals of Allergy Asthma & Immunology* 1999)
- UK – "slightly more common" among S.Asians; possibly less education & less self-management training given (Partridge, *Thorax* 2000)
- UK - increased hospital admission rates; asthma control improved by increasing patient confidence (Griffiths, *BMJ* 2001)
- UK – S. Asians & Blacks more likely to need emergency care; lowest rates of symptoms/diagnosed asthma but 3x white hospital admission (Asthma UK, *Lancet* 2005)

South Asian health disparities

Why might there be asthma disparities?

- Barriers to care
  - Linguistic
  - Access & Affordability
  - Awareness
  - Cultural beliefs/misconceptions/stigma (infectious?)
- Genetic?
  - IFNG locus on 12q21 gene (Nagarkatti et al, Delhi 2002)
- Demographic/Socio-economic & political
  - 12th on national poverty scale
  - Immigration concerns → low importance to asthma, illegal housing situations
- Geography
  - Queens is home to 2/3s population – low prevalence/admission rates, but because of "ethnic islands" → low knowledge? (Queens: 19.1%; Brooklyn: 30.9%; Bronx: 30.8%; Manhattan: 12.8%; Staten Island: 6.5%)

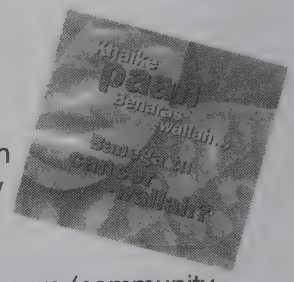
Summary of Lessons Learned

- Working with media: very important community education tool
  - Help with translation, foray into community, source of authority
- Groups organized around labor, age group, geography not to be forgotten
  - Taxi workers, construction workers, police officers, small business owners, professional groups, youth groups, senior groups
- Liaise with community care givers
  - Patient-provider concordance, linguistic/cultural similarities, capacity building, subsidized care

Summary of Lessons Learned (cont.)

- Health education materials
  - linguistically/culturally competent; develop with community
- School-based and (smaller) faith-based successful
  - health fairs: difficult to follow-up
- Keep in mind barriers to care
  - financial, time off from work, cultural beliefs/health care seeking behaviors, linguistic, immigration concerns, etc.

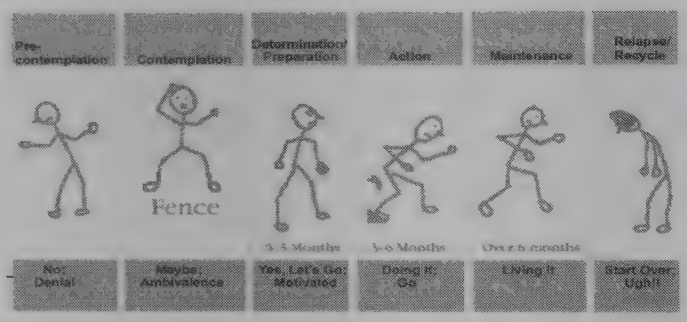
Materials Development Protocol



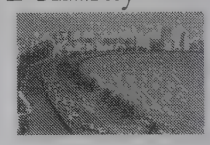
- Collect relevant material from local/international sources
- "Transcreate" content & design to make culturally/linguistically competent
- Professional revisions
- Focus group testing with end users (community members)
- Suggestions for dissemination obtained from community members, done WITH community

STOP PAAN Social Media

→ **Educate ***
→ **Motivate**
→ **Behavior Change**
→ **Sustain & Support**



What can we learn from the Bombay experience?



- Domestic-International interface
  - South Asians: very transient population
  - Sharing of materials
  - Sources of validity
- Possibilities for program design
  - Review lessons learned
  - Research
  - Keep community perspective at front of mind

Past collaborations & potential for more

- STOP PAAN: Working with Bombay hospitals, researchers
- Cardiovascular disease: Working with Bombay, Canada, Chicago, California,
- Health outreach: working with professional groups (AAPI in New Jersey)
- Bombay Workshop on International Health: Childhood Asthma!

Closing: Benefits of a NYC-Bombay partner-city approach

- Learning from culturally competent models, successful intervention approaches
- Gaining research prevalence data from "home country"
- Interacting with health care professionals from similar linguistic/cultural background
- Ensuring transient populations a continuum of education, care, awareness

Speaker : Rajesh Kotecha, *CEO, Chakrapani Ayurveda Clinic & Research Centre, Jaipur* —
Use of Ayurveda in asthma management

Use of Ayurveda in asthma management

Dr. Rajesh Kotecha 'Vaidya' CEO, Chakrapani Ayurveda Clinic & Research Centre, Jaipur

APPROACH OF AYURVEDA

PHILOSOPHICAL ·
HOLISTIC HUMANISTIC

AYURVEDA IS
More Life and Health oriented than Disease and Treatment

Ayurveda presents a total Life Science and visualizes the total health to the total human being in a holistic way.

LOKA PURUSHA SAMYA
(Macrocosm- Microcosm continnum)

*INDIVIDUAL * UNIVERSE

Pancha Mahabhutas

PANCHMAHABHUTAS

1. AKASHA (Eather / space)
2. VAYU (Air / motion)
3. TEJA (Fire / radiant energy)
4. JALA (water / cohesive factor)
5. PRITHVI (Earth / mass)

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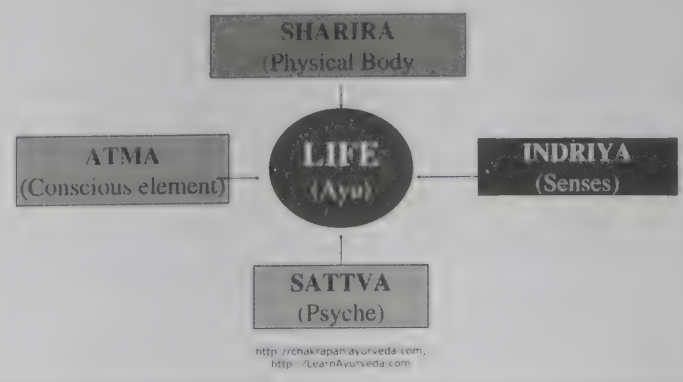
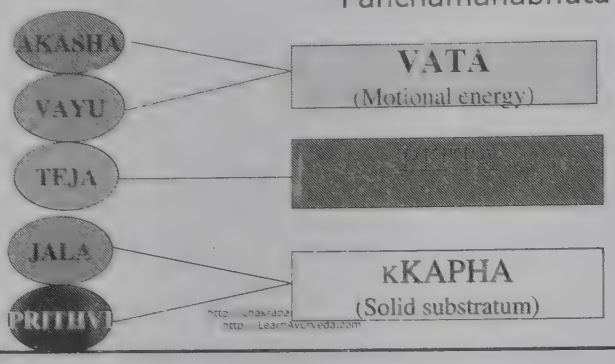
Life (Ayu) and Panchamahabhuta Theory



The Theory of Tridosha

Panchamahabhuta → Biological applications of Panchamahabhuta



Genetically determined relative proportion of DOSHAS within the normal range

↓

DOSHAJA PRAKRITI (body type)

The total Personality
(Physique, Physiology & Psyche)

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In Ayurveda, the ailment similar to Asthma is known as Tamaka Shwasa. This is a sub-type among one of five Shwasa Roga.

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Five Types of Swasa Roga

Maha Shwasa
Urdhva Shwasa
Chhinna Shwasa
Tamak Shwasa
Kshudra Shwasa

Among these five types first three are not curable. Tamak Shwasa or Asthma is 'Yapya' (Controllable) and is difficult to cure. The last one is curable.

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Pathogenesis of Swasa

The vitiated 'Pranvayu' combines with deranged 'Kapha dosha' in the lungs causing obstruction in the 'Pranavaha srotasa' (Respiratory passage). This results in gasping and laboured breathing. This condition is known as 'Shwasa Roga'

Causative factors of Shwasa - I

Factors related to Ahara (diet):
Excessive indulgence in left over beans, black grams, raw milk, soar curd, excess salt, flesh of aquatic and wet land animals.

Excessive use of 'Ruksha' (dry) and 'Guru' (heavy) diet, excessive use of cold water and cold drinks.

Excessive use of 'Abhishyandi' (Kapha producing) diet, Excessive use of not easily digestible and irritant food.

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Causative factors of Shwasa - II

Factors related to Vihara (environmental and other external factors):
Excessive exposure to dust and smoke.
Excessive exposure to wind, cold, cold bath or excessive heat, sun bath.
Exhaustive exercise, walking, excessive sexual activities.
Suppression of natural urges
Psychogenic factors

Other Factors:
Trauma to vital organs viz. - chest, throat
Asthma may be as a consequence of other diseases like - long standing Fever of any cause, long standing common cold, tuberculosis , anemia, heart disease etc.
Trait or susceptibility due to genetic factors

In India, there is a cultural misconception that asthma is a contagious disease and has something to do with food. But avoiding certain types of food, that's taking it a bit too far.

Martyn R Partridge
Professor of Respiratory Medicine
United Kingdom.

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Ayurveda Approach to Asthma Management

- Pranayama and regular activities related to strengthening of Prana energy and Ojas (general immunity). This approach is known as specific Rasayana (rejuvenation) to Pranavaha Srotas (lungs and airway channels). Prana is one among five sub type of Vata.
- Balancing between Vata and Kapha at the same time
- Oral intake of medicinal herbs and minerals
- Detoxification protocols for severely affected patients known as Panchakarma

Number of herbs are reported in Ayurveda, that provides as a whole protection against asthmatic attacks naturally without any side effects and gradually helps a suffering person to recover from asthma.

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Adhatoda vasica

Adhatoda vasica commonly known as Vasaka is indigenous to India, where it is found in sub-Himalayan track. It has been used for the treatment of various diseases and disorders, particularly for the respiratory tract ailments. In Ayurveda, the juice expressed from the leaves and the decoction of the leaves and roots are useful in asthma, bronchitis, and other chronic coughs.

Preclinical studies have shown that the alkaloids from Adhatoda vasica showed pronounced protection against allergen-induced bronchial obstruction in guinea pigs. Pharmacological effects of plant extracts in humans need to be further studied.

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Ocimum sanctum

Tulsi, an indigenous plant of India botanically known as Ocimum sanctum has been used historically since the vedic period. Hindus regard it as an earthly manifestation of goddess Vrindavani, who is dear to Lord Vishnu. Holy basil has number of therapeutic applications.
The anti-asthmatic activity of the extract of dried and fresh leaves, and the volatile and fixed oils of Ocimum sanctum were evaluated against histamine and acetylcholine-induced pre-convulsive dyspnea (PCD) in guinea pigs. The extract of fresh leaves, volatile oil extracted from fresh leaves and fixed oil from the seeds significantly protected the guinea pigs against histamine-and acetylcholine-induced PCD. These extracts also inhibited hind paw edema induced in rats by treatment with carrageenan, serotonin, histamine of PGE2. The leaves of the Ocimum sanctum plant were tried in cases of bronchial asthma, the Ocimum sanctum was found to be highly efficacious.

Picrorrhiza kurroa

Kutki botanically known as Picrorhiza kurroa is a small perennial herb is found in the Himalayan region. The name 'Kutki' seems to have been derived from the Sanskrit name 'Katuka', which means bitter taste. It is a well-known herb in the Ayurvedia and has historically been used to treat disorders of the liver and upper respiratory tract, asthma, reduce fevers, and to treat dyspepsia, chronic diarrhea, and scorpion sting.
A trial was carried out using crude rhizome powder of Picrorrhiza kurroa as monotherapy in high doses on patients of obstructive airway diseases. A significant reduction in the global score of respiratory sign and symptoms was observed along with reductions in the eosinophil count of the blood. There was significant improvement in the respiratory functions and viscosity of the sputum decreased with one week of treatment. Preclinical studies also reported that Picrorrhiza kurroa prevented allergen- and platelet-activating factor-induced bronchial obstruction (10 mg/kg orally; 0.5 mg inhalative).

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Tylophora asthmatica

Tylophora asthmatica (syn. Tylophora indica) commonly known as Indian ipecac has its long-standing use as a folk remedy for asthma, and other respiratory problems like bronchitis, rheumatism, and dermatitis.
Tylophora asthmatica is clinically trialed in 110 bronchial asthma patients. After six days treatment, 62% of the patients consuming tylophora reported experiencing moderate to complete relief of their asthma symptoms compared to 28% in the placebo group. Moreover, when patients were switched from the placebo to the active group and vice versa, similar positive trends could be seen, with 50% of the tylophora group and 11% of the placebo group reporting symptomatic relief. In a follow-up study, the extract of Tylophora asthmatica leaves exhibited moderate to complete improvement in asthmatic symptoms in 56% of the patients compared to 32% in the placebo group.
In another study one group received either 350 mg of Tylophora leaf powder or placebo daily in the first week. A second group of asthmatics were given a similar amount of the leaf for seven days followed by an anti-asthmatic drug combination. Overall, results of the study showed the amount of oxygen in the lungs (e.g., vital capacity) increased in those using the leaf, but decreased in those using the placebo. In addition, those taking the herb had a notable nighttime reduction in their symptoms of shortness of breath.

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Shallaki

A 1998 6-week, double-blind, placebo-controlled study of 80 individuals with relatively mild asthma found that treatment with Boswellia at a dose of 300 mg three times daily for 6 weeks reduced the frequency of asthma attacks and improved FEV1, peak expiratory flow rate, and forced vital capacity and decreased eosinophil counts.

In animal studies, Boswellia has been found to inhibit 5-lipo-oxygenase and leukotriene B4 production, which cause bronchoconstriction, chemotaxis, and increased vascular permeability.

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Some common herb suggestions

- Pippli (Piper longum), Haridra (Turmeric), Sunthi (ginger), Tejpatra (leaves of cinnamon), Twak (cinnamon), Marich (black pepper)
- These herbs are commonly available and one can take different combinations in the form of herbal teas
- Ushnodaka (once boiled and taken in luke warm condition)

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Silicosis & Pneumoconiosis

- Among the environmental diseases those which have remained as the challenge are considered gruesome. Silicosis and Pneumoconiosis are such an occupational lung disease.
- We have conducted a multi center clinical trial on proven cases of Silicosis and Pneumoconiosis in 1995-96 with the help of Prof. G.D. Agrawal and with financial assistance of Envirotech Group, Delhi.
- The trial was conducted at Khambat (Gujarat) on Agate workers, at Karwi (Chitrakoot) on traditional workers making stone idols, cement plant workers at Orissa Cement Works, Rajnandgaon and coal mine workers of Janvadova mine, Dhanbad.

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This was probably first incidence where Ayurveda did entered formally to find out ways and means to help people suffering from occupational disorder caused from environmental reasons.

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Selected Herbs

- Vyoshantaka Vati (Chakradatt) contains Trikatu, Chitrak, Amlavetas, Taleespatra, Chavya, Twak, Ela, Yavani & Tejpatra
- Gudavaleha (Yogaratnakar) contain jaggery (natural unprocessed cane sugar) and mustard oil in equal proposition

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- Taleespatra – Abis webbiana
- Chitrak – Plumbago zeylanica
- Trikatu - Piper nigrum, Piper longum and Zinziber officinalis
- Amlaavetas – Garcinia pedumculata
- Chavya – Piper chava
- Twak – Cinnamomum zeylanicum
- Tejpatra – Cinnamomum iners
- Yavani – Trachyospermum ammi
- Ela – Eletteria cardamomum

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Observations

- 75% of the persons selected for the study have exposure to silica dust / coal dust for more than 20 years (n = 68)
- Only 0.68% (1 person) had exposure level of less than 10 years (n = 68)

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Observations

- It was very interesting that combination of these 2 formulations showed highly significant ($P<0.001$) improvement in cardinal symptoms like dyspnoea, cough and chest pain (n=68)
- Also, it showed significant improvement ($P<0.01$) in associated signs and symptoms like loss of appetite, loss of weight, body ache and fever

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Observations

- The follow-up study showed less incidences of relapses ($P<0.001$) in next 3 month time.
- It was however not statistically important in the area of pulmonary function tests (FVC, FEV1, FEV1/FVC) and x-ray of the patients. The duration of study was 45 days only.
- Study with longer duration is required to validate these primary observations

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Conclusions

- How Ayurveda can help for Asthma?
- By proper understanding of body types, life style, foods etc.
- Rasayana approach – regular rejuvenation by Pranayama and certain herbs
- Help in maintaining optimal health by safer herbs as compared to conventional medicine
- More in-depth studies are required

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Speaker : Jacqueline Fox-Pascal, *Deputy Director, New York City Asthma Initiative* —
Lessons from Community-Based Asthma Intervention in New York City

Lessons from Community-Based Asthma Intervention in NYC

Jacqueline Fox-Pascal, MHS (Presenter)
Deputy Director, NYC Asthma Initiative
Lorna E. Davis, MS, Director
NYC Asthma Initiative

NYC Department of Health and Mental Hygiene
Division of Health Promotion and Disease Prevention
Bureau of Chronic Disease Prevention & Control

NYC Health

Presentation Snapshot

- Brief overview of Asthma in NYC
- Building NYC Asthma Partnership- What NYC did and continues to do about asthma
- Overview of Partnership Committees and results achieved
- Key Community Based interventions

Asthma in NYC Cont'd

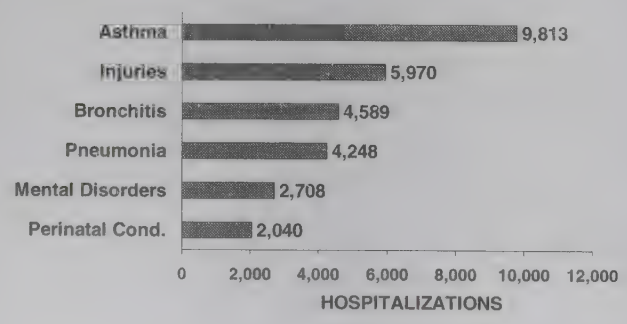
NYC Health

- **300,000 children and 700,000 adults diagnosed with asthma** (NYC DOHMH Community Survey 2002)
- **Hospitalization rate among children in low income neighborhoods is almost 3 times greater than in high income neighborhoods**

What we also know about asthma in NYC

- 1 in 4 adults with asthma smoke cigarettes
- About 1 in 5 children with asthma are exposed to second hand smoke in their homes

Leading Causes of Hospitalization in Children Ages 0-14, New York City, 2002



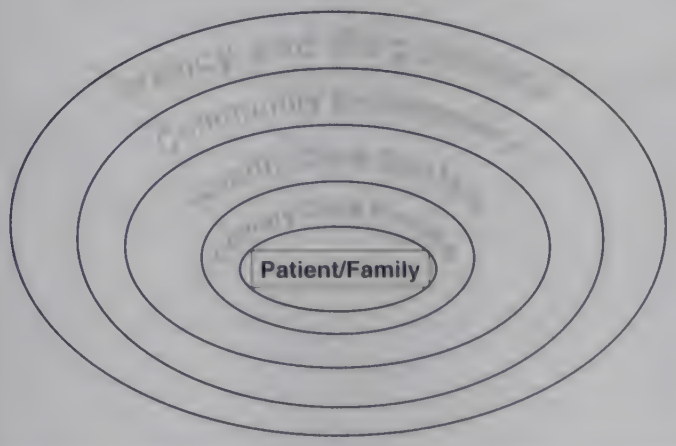
What are we doing about asthma in NYC

NEW YORK CITY ASTHMA INITIATIVE

Mission:

To reduce illness and death from asthma in New York City by:

Public Health Approach



Program Goals

- Decrease Hospitalizations and Emergency Department visits related to asthma
- Decrease school absences
- Decrease symptom days
- Decrease need for quick relief medication
- Decrease limitations on physical activity

New York City Asthma Partnership- Overview

- **NYCAP is a coalition of over 300 individuals and organizations who share a common interest in reversing the asthma epidemic in NYC**
- **Members include:**
  - Community-based organizations
  - Government agencies
  - Academic institutions
  - Hospitals and Medical centers
  - Social service agencies
  - Health Insurance/Managed Care Organizations
  - Individuals with Asthma

New York City Asthma Partnership (NYCAP)

How did the partnership start

- NYCAP was convened by DOHMH in November 2000 with a mission to advance a plan for asthma control in NYC:
- An Interim Steering Committee established
- Workgroups/committees grew out of Steering Committee: *Medical Standards of Care, Organization/Planning, Environment, Schools, Data & Research*

NYCAP cont'd

- Interim Steering Committee convened the first Annual Meeting - May 2001 to:
  - Announce the formation of the partnership
  - Unveil proposed membership structure
  - Unveil proposed rules of operation
  - Recruit members from various sectors
  - Populate NYCAP committees
  - Set schedule for regular meetings: 2 general semi-annual meetings per year; monthly committee meetings, semi-monthly steering committee meetings

NYCAP Strategic Plan

- Engaged consultants to work with members to develop strategic plan 2003
- All members participated in the planning process at June 2003 annual meeting
- Major focus areas emerging from strategic plan:
  - Health Systems Delivery
  - Schools, Childcare & Recreation Programs (Non-Medical Delivery Systems)
  - Environment
  - Data and Research
  - Communications
  - Education

NYCAP Major Successes

- Passage of ED/SPARCS bill 2000
- Improving system for accessing asthma medications in NYC schools
- Coalition support led to restoration of asthma funds to city budget
- Advocating for changes in smoking and bus idling laws

NYCAP Benefits

- Strategic plan facilitated program development and partnership decision making
- Partnership supports and informs citywide asthma programming
- Mini-grant support to partnership members have enhanced citywide asthma education

Key Community Based Interventions

Case Management

Care Coordination

Asthma Awareness Training

Media Campaign

Case Management

- **Overall Goal: Improve Self/Family Management of Asthma**
  - **Home visiting program that worked one-on-one with families to teach and empower them. Case Management educational services consisted of:**
    - **What is Asthma**
    - **What are your triggers**
    - **What are your medications and how they work**
    - **What is the equipment you need and how to use it properly**
    - **Home environmental assessments and remediation**

Case Management Cont'd

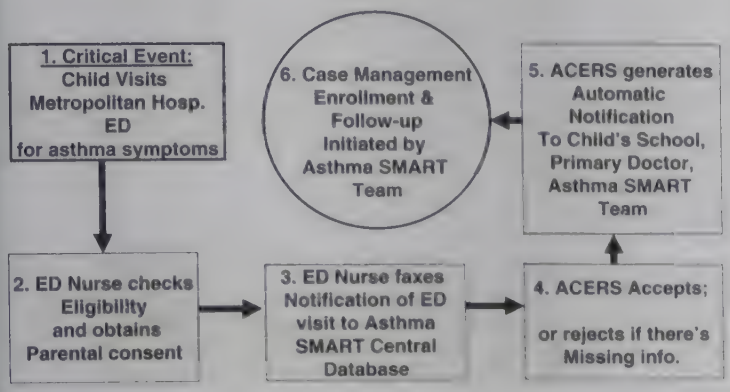
- Community Health Worker (CHW) Model
  - CHW's indigenous to community
  - Trained on Asthma
  - Trained on NYCDOH Case Management Protocol
  - Responsible for case finding, and case managing families
  - Conducts Home Visits to families
  - Responsible for advocacy & referrals

Care Coordination: Asthma SMART

Goal: To prevent unnecessary ED visits and hospitalizations among children with poorly controlled asthma

- **Program Developed in 2000 by DOHMH in response to high asthma hospitalization rates among children in East Harlem**
- **Focuses on Symptom Monitoring and Response Tracking for children with asthma**
- **Targeted children visiting ED at Metropolitan Hospital for asthma (main hospital serving residents of EH)**

NYC Childhood Asthma Initiative
Asthma SMART
Asthma Critical Event Response System


1. Critical Event: Child Visits Metropolitan Hosp. ED for asthma symptoms
2. ED Nurse checks Eligibility and obtains Parental consent
3. ED Nurse faxes Notification of ED visit to Asthma SMART Central Database
4. ACERS Accepts; or rejects if there's Missing info.
5. ACERS generates Automatic Notification To Child's School, Primary Doctor, Asthma SMART Team
6. Case Management Enrollment & Follow-up Initiated by Asthma SMART Team

Asthma SMART Outcomes

- **Children enrolled in case management averaged 0.343 ED visits following the initial intake, with a range of 0-6 ED Visits. 77% of them having no subsequent visits.**

Asthma SMART Benefits

- Demonstrated an effective way to coordinate care for children with asthma between ED, primary provider, school, and daycare
- Strengthened relationship between local health department, schools and hospitals leading to sustained care coordination in target neighborhood.

Asthma Training Institute

- Building capacity for community asthma education
  - -Standardizing key asthma messages
  - -Developing communities of practice for health educators and case workers to improve asthma education to parents and families
  - -Enhancing medical provider education

Asthma Training Institute

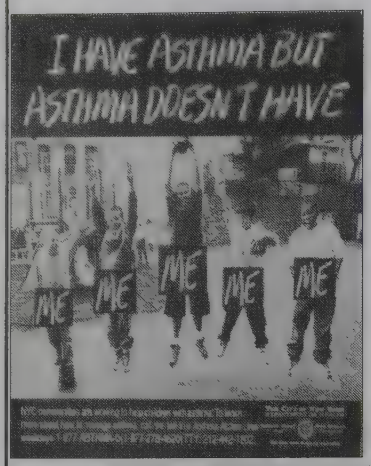
Progress to date:

- ATI established 7/04- Training database, Asthma Basics Training of Trainer, and Training calendar developed
- 412 of 500 (85%) of DHS General Shelter Staff trained on Asthma
- All school health physicians trained
- 42 Health Educators/case managers formed citywide community asthma education committee/ community of practice to improve citywide asthma education
- Collaborate with hospitals and health centers to train physicians, nurses, PA's and RRT's: Over 300 providers trained

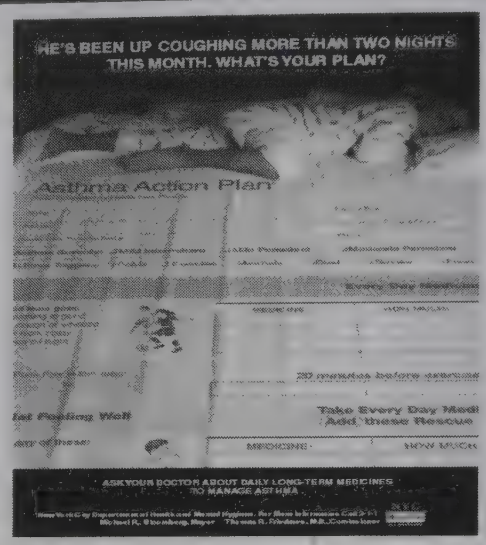
Media Campaign

Five Year campaign targeting children with asthma, their parents, and caregivers with a fundamental message that kids with asthma can do anything!

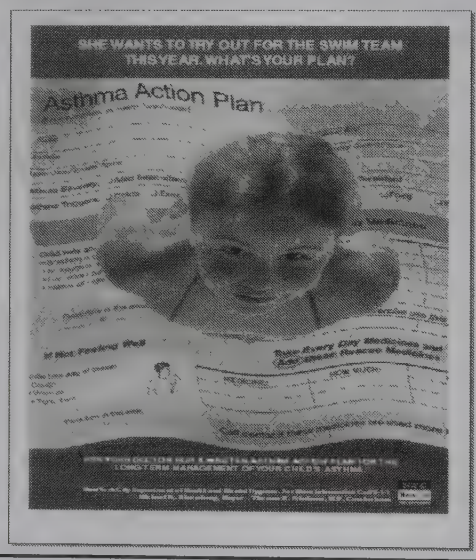
First NYC Asthma Media Campaign



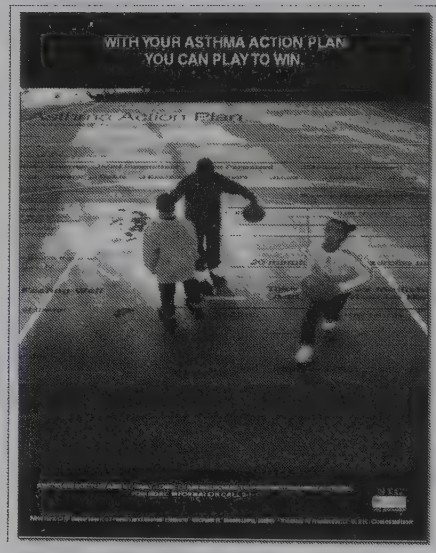
2003-2004 Media Campaign


HE'S BEEN UP COUGHING MORE THAN TWO NIGHTS THIS MONTH. WHAT'S YOUR PLAN?
Asthma Action Plan
Take Every Day Med!
Add These Rescue
ASK YOUR DOCTOR ABOUT DAILY LONG-TERM MEDICINES TO MANAGE ASTHMA

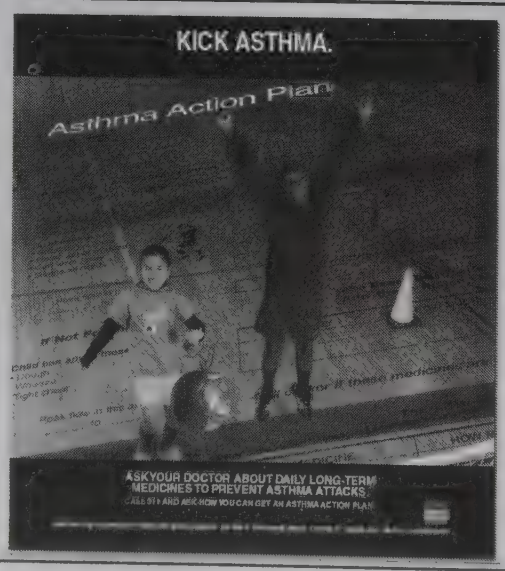
2003-2004 Media Campaign


SHE WANTS TO TRY OUT FOR THE SWIM TEAM THIS YEAR. WHAT'S YOUR PLAN?
Asthma Action Plan
LONG-TERM MANAGEMENT OF YOUR CHILD'S ASTHMA

Summer /Fall 2004



Summer /Fall 2004


KICK ASTHMA.
Asthma Action Plan
ASK YOUR DOCTOR ABOUT DAILY LONG-TERM MEDICINES TO PREVENT ASTHMA ATTACKS.
CALL 311 AND ASK HOW YOU CAN GET AN ASTHMA ACTION PLAN

What has worked and not

Worked
- Citywide Partnership
- Care Coordination
- Training Institute
- Media Campaign

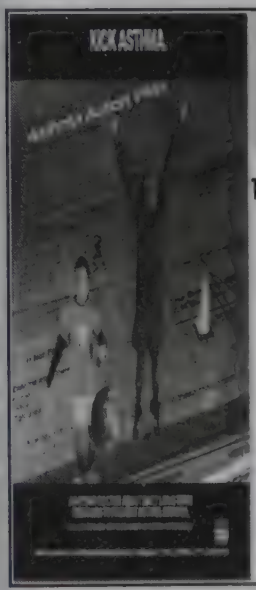
Not Worked:
- Direct Community Education
- Asthma Resource Centers & Support Groups

What NYC can learn from the Mumbai Experience

- Creative ways to develop asthma interventions with NYC's South Asian population
- Holistic activities that can be incorporated into asthma care.

Potential areas of collaboration

- Establishing ongoing communication network between NYCAP and counterpart in Mumbai
- Sharing/enhancing tools and materials developed by NYC
- Assist with designing community level intervention based on NYC experience.



Q &A

Thank you for inviting me to share information about our efforts!

New York City Department of Health & Mental Hygiene
Asthma Initiative
Bureau of Chronic Disease Prevention and Control

Jacqueline Fox-Pascal
Jfox@health.nyc.gov
nyc.gov/health/asthma

NYC Health

Speaker : D R Vaze, *Kaivalyadhama, Lonavalla*—Use of yoga in asthma management

ROLE OF YOGA IN ASTHMA MANAGEMENT

Presentation by Kaivalyadham, Lonavla
(An institute for Scientific & Philosophico Literary Research , Training and Therapy in Yoga , Estb:1924)
(Aided by Ministry of HRD Govt. of India and Department of Higher & Technical Education Govt. of Maharashthra)
Dr. D.R. Vaze, MD,P.W.S.Y. & A.M.

MAGNITUDE OF PROBLEM

WHO statistics suggest that over 150 million people world over suffer from bronchial Asthma and the number is constantly increasing due to increase in pollution.

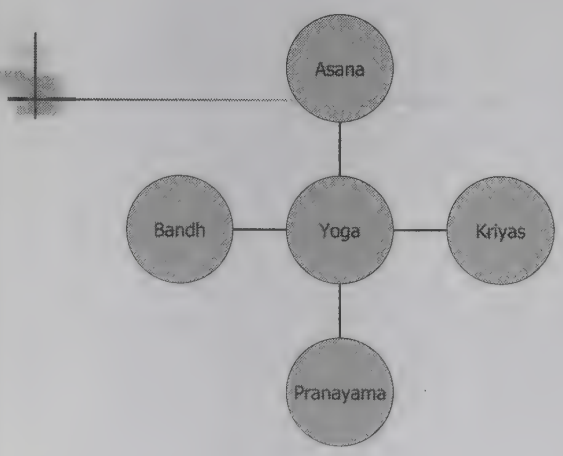
In India Asthma Prevalence :-
Adults :- 2.5%, Children :- 5%

ETIOLOGY:-THERE ARE VARIED FACTORS RESPONSIBLE

1. CHANGE IN WEATHER
2. DUST
3. SMOKE
4. SOUR & COLD FOOD ARTICLES
5. POLLENS
6. STRONG SCENTS
7. PET ANIMALS – DOGS, CATS DUE TO ALLERGY FROM THEIR FUR

Role of Yoga

- In dealing with Asthma , approach of Yoga is holistic . It emphasizes on diet, proper surroundings and physical activity.
- To maintain and/or achieve peace of mind .
- Its not always possible to change the environment around us immediately. In such circumstance Yoga enables an individual physically – psychologically to meet the challenges.



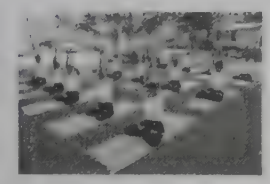
CLEANSING PROCESS

ASANA RELAXATIVE LIKE SHAVASANA, MAKRASANA, PRANAYAMA

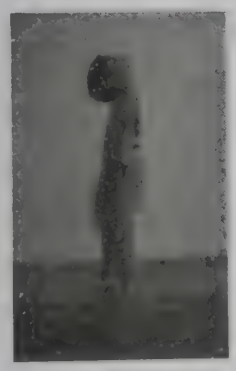
- CULTURAL ASANAS
- Bhujangasana
- Chakrasana
- Vakrasana
- Gomukhasana
- Yoga Mudra
- Dhanurasana

Cont..

- CULTURAL ASANA
  - Parvatasana
  - Tadasana
  - Vajrasan
  - Gomukhasana
  - Ardhmasendrasana
  - PRANAYAMA
    - Ujjayi
    - Anuloma Viloma
    - Om Kar Recitation

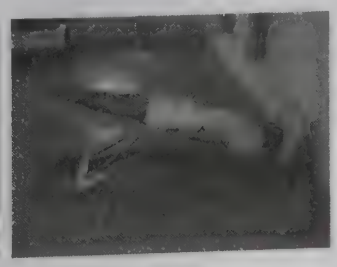


STANDING



BREATHING WITH RESTING CHEST ON THE CHAIR

Jeevan Yantra & Inclined Plane



BENEFITS OBSERVED

- Improvement in parameters of pulmonary function tests. (Yoga Mimamsa Journal – April 1977 – Vol 19 (1)
- Improvement in breath holding time, stamina, digestive capacity (YM – Vol 27 – Pg 9 & 10 1988)
- Reduction in symptoms- number/frequency/severity of attacks/reduction in ronchi / wheezing sound / sneezing cough / infection / fever/disturbance in sleep (Research project under CCRYN on Effect of Yoga on Stress Relates Disorders)
- Reduction in eosinophilia, increase in HB (A A Khanan & U.S.Guleria Inc Physiology and Pharmacology 1996)

- **Reduction in resting heart rate/ Improvement of relaxation of voluntary inspiratory & expiratory muscles***
- **Significant improvement of relaxation of voluntary inspiratory and expirtory muscles.***

(*F.Shannahoff , Khalsa & L.R.Becheti Unioversity of Calafornia International Journal of Neuroscience March 1996)

STEPS TO BE TAKEN

- For children Yoga should be introduced as part of their health & physical education in schools.
- Awareness about Yogic intervention to the parents.
- Physicians should motivate parents to initiate their children suffering from asthma to Yoga.
- Media should play active role in generating awareness of Yoga in prevention and control of Asthma.

Thank You

Have a nice day.

Speaker **Kalpana Sharma,** *Deputy Editor, The Hindu, Mumbai.*

Appraisal of the role of the media in awareness building regarding environmental issues

I became aware of how serious the issue of asthma can be when a friend in Sao Paulo died recently due to an asthma attack. She lived just 2 kms away from the hospital, but it took 20 minutes to reach there because of traffic jams, which proved too late.

Asthma is not so much a personal problem as a societal one. The questions that beg asking are: What kind of cities are we building? Are the roads adequate in cities? What sort of transport facilities are we building? What sort of industries are we building—are they adding to pollution? The media in India does not understand the linkage between the type of cities and transport systems we have and the high incidence of asthma.

It was only after the Bhopal tragedy that the implication and enormous consequence of wrong siting of hazardous industries began to be understood. The questions that came to the forefront were who gave permission to build this chemical plant (Union Carbide plant) in that area? What were the safety norms being followed? What kind of industry was this that deviates from the safety norms that resulted in the loss of so many lives? There was a larger context to these questions, ie, the nature and path of development that India has taken.

Soon after the Bhopal accident, the media became more sensitive to issues of pollution, hazardous nature of chemicals, etc, and for a while the media highlighted these issues. But in the decade of the 1990s, liberalization became a buzzword, and the media became more market-driven. Today, a corporatized media publishes whatever is "sexy". For example, the media deals with health issues related to lifestyles, eg, diabetes, hypertension, health fitness, diets, workouts, etc. The media prefers to talk about new car launches, the luxury features of these cars, and even publishes full page advertisements of new car launches, but not about the pollution they cause or the injury they cause to human health and the environment. The media hardly ever talks of why are so many vehicle licences are being issued, the proliferation of vehicles on the roads and what this means to people's health, the bad conditions of the roads. There is talk about Mumbai going the Shanghai-way, great new freeways, etc. But no discussion whatsoever on improving the public transport system, how the majority of Mumbaikars can travel safely and in reasonable comfort, causing minimum emissions.

The electronic media has done no better than the print media. The boom in the electronic media has seen the advent of "soundbites". For example, the TV anchor asks the reporter "And what does the public have to say about pollution?" In turn the reporter asks someone in the crowd "And what do you think about pollution?" and before the person has said anything, the reporter passes back to the anchor, and the anchor says, "Well public has this to say about pollution." In reality, nothing of substance is said, but it is made out that a lot has been said.

Given the cutthroat competition in the media world, even serious newspapers have had to become "flashy". There is virtually no investigative journalism being done at all these days, and no one questions why this state of affairs

has come to be, and who is responsible for it Journalism is now a farce—put out some flashy information, with no proper facts. I sincerely hope this is a transient phenomenon, and that serious journalism comes back. For that to happen, reporters must have the freedom to do quality investigative reports, draw linkages between various facts, investigate the source of problems, and possible solutions, not just do single issue campaigns. Reporters should work in such a way that both policy makers and authorities in government and the citizens are informed about serious issues.

It is a challenge for the media to play a role to bring about awareness about issues related to pollution and environmental health. There are a lot of constraints. Even middle to senior level journalists have little influence on what is published. The top people decide what will be printed, and news items that "sell" influence their decisions.

Yet, some there is space in the media to get good messages out, eg, nowadays we have TV spots targeting middle-class women informing them about how they could be inflicted with HIV because of their husband's lifestyle. In the same way, the print media could make citizens aware of linkages between pollution and asthma.

Groups that are interested in bringing about greater awareness on issues related to pollution and environmental health must find creative ways to get journalists to get involved with such issues.

Speaker **Shyam Diwan**, *Advocate, Mumbai High Court, Mumbai.*

How effective have the courts been in tackling air pollution and in providing relief to those affected by it?

Introductory remarks

India employs a comprehensive system of laws and regulations to tackle environmental issues and regulate natural resources. These laws are mirrored in similar enactments elsewhere in the world. However, in the field of implementation, India's story is unique. There is a dichotomy in respect of enforcement: one limb—represented by the pollution control boards, city administrations, forest bureaucracies, etc. who have been inept and hamstrung; the second limb—represented by citizen-driven court initiatives through public interest litigations.

Most of the serious implementation initiatives in the field on environment have been because of mandatory Court directions, rather than any vision or zeal on the part of government agencies.

It is within this framework that the role of Courts may be examined.

The framework of environmental laws in India dealing with air pollution

The principal statutes are:

- The Air (Prevention and Control of Pollution) Act, 1981 which introduced a permit system for industries discharging air pollutants;
- The Environment (Protection) Act, 1986 which provides for national ambient air quality and emission standards and also empowers the closing down of defaulting units;

- The Motor Vehicles Act, 1988 and the Motor Vehicles Rules, 1989, which provide for a 'pollution under control' certification system in respect of motor car emissions.
- For the purpose of the judicial initiatives, the principal constitutional provision is Article 21 of the Constitution of India. Article 21 enshrines the fundamental right to life and this provision has been judicially construed as entitling every person to a healthful or wholesome environment.

The role of Courts

- **The traditional role of judges was mostly in respect of prosecutions:** Until the mid-1980s, the role of Courts in environmental cases was mostly with reference to prosecutions launched against offending industries or other violators. The Courts were primarily used by polluters to block or prevent prosecutions; or in nuisance actions, to allow the offending activity to continue with appropriate checks.
- **The pro-active role in public interest litigations:** Following the lead of US Courts which had spurred civil rights reforms, a new 'human rights' jurisprudence was encouraged by the Indian Supreme Court after the Emergency of 1975 – 77. In the mid 1980s, particularly after the Bhopal gas leak tragedy, the human rights jurisprudence assumed an environmental dimension as well.

By the 1990s, the Indian Supreme Court and the High Courts were dealing with major environmental cases concerning forests, river pollution, coastal ecology, air pollution, quarrying, etc. These cases arose from citizen complaints to the Courts that the government agencies were permitting environmental degradation.

Major air pollution cases

- ***The Taj Mahal case:*** This case concerned protection of the Taj Mahal by regulating polluting activities in parts of five districts around Agra described as the Taj Trapezium areas. The Supreme Court restricted industrial activities within the Taj Trapezium area, directed the shifting of industries away from the locality and mandated the use of clean fuels.
- ***The Vehicular Pollution cases:*** In these cases, the Supreme Court and the High Courts have forced vehicle manufacturers to observe more stringent emission norms for new vehicles. The Courts have also required transport companies to re-organize their fleets by deploying clean fuel vehicles and to scrap old buses.
- ***The Dahanu Thermal Power Station case:*** The Supreme Court required the energy company to comply with conditions imposed by the Environment Ministry including the installation of an FGD Unit. This FGD unit has still to be installed after more than a decade.
- ***Stone quarrying cases:*** In these cases, the Supreme Court and the High Courts have issued directions to reduce air pollution from quarries.
- ***Deonar Dumping Ground case:*** Here the Bombay High Court issued directions to the Pollution Control Board and city administration to ensure that there was no burning of municipal solid waste. The smoke rising from the dumping ground was causing adverse respiratory impacts

on residents in two or three suburbs of Bombay.

Assessing the Courts' record

Where have the Courts succeeded?

- In individual cases, the most pressing pollution has been curtailed (e.g. the Ganga pollution case, the Taj Mahal case, Vehicular emission case, etc.)
- The Supreme Court has laid down beneficial principles that are being applied in the field by the lower judiciary and bureaucrats. These principles include the precautionary principle; the polluter pays principle; sustainable development; public trust doctrine and a notion of intergenerational activity.
- The Courts have given a higher profile to environmental issues and have set the agenda for discussion, debate and action by focusing on particular environmental problems such as the denudation of forests, poaching of wildlife, etc. In some cases such as the Motor Vehicles' case, the Courts have forced the adoption of more advanced and better technologies.
- By siding with environmental causes and by insisting upon compliance with environmental laws, the judiciary has created a better enforcement and implementation culture. The cost of non-compliance has been raised. Bureaucrats now realize that the courts mean business. This is because in the 1990s several industries were shut down for failure to comply with environmental norms.

Where have the Courts failed?

- Implementation of Court directions is often a difficult process. Frequently, orders are passed by Courts but are not implemented in letter and spirit. This results in the environmental problem persisting and a lowering in the prestige of the Court.
- Given the geographic size and diversity of the country as well as the size of the population, it is impossible for courts to administer nationwide environment improvement programmes. The judicial response works best in specific cases and can only complement agency action.
- Despite attempts, there has been no significant improvement in the role of bureaucracies despite persistent judicial prodding for nearly two decades. Since courts lack expertise as well as the capacity to make budgets and employ staff, judicial directions are limited to only the most glaring failures by the bureaucracy. Less high profile or 'charismatic' environmental problems, albeit significant, do not get much judicial attention. Equally, where the agency shows it is doing something - almost anything at all (and far less than what is required) the Courts will keep away.

There are several environmental problems that are complex and intricate and which require evolving strategies. The courts are ill quipped to deal with such dynamic issues.

Some future directions

- **Land and environment Courts:** The judiciary is under tremendous pressure on its resources. There is little time for environmental cases. The backlog is mounting. There is a need for special land and environment courts at the district level, with specialized judges, who can deal with environment related disputes.

- **Citizens' institutions:** A large number of NGOs work in their respective fields in Indian cities, towns and villages. Cities like Bombay which suffer from a large number of environmental problems of great magnitude require to build a citizens' institutions that can holistically assess and address the city's needs rather than the present model of individual NGOs taking up issues in particular neighbourhoods. At present, the citizens' initiatives have a relatively narrow focus.
- Political institutions: None of the Indian cities have a political structure by which there is an elected official directly answerable to the citizens of the metropolis. As a result, there is no one person championing the cause of or addressing the needs of the city, particularly from an environmental standpoint. This means re-working the political architecture so that elected representatives (like a directly elected mayor) can harness support to address city specific issues.

Discussion

Nergis Irani: Not a single order of High Court/ Supreme Court is being implemented (in Dahanu). How do we get the High Court and Supreme Court orders to be implemented?

Shyam Diwan: That is a continuous ongoing eternal battle, and getting orders is going to be difficult. Vigilance and constantly being at it is the only way. We have to continue putting pressure and go on battling. Lawyers' tactics will evolve over time to ensure that orders are implemented and that there are no loopholes.

Amit Chauhan: Why things are not being implemented is because we fight hard, but not 'smart'. We need to get a body to monitor implementation of orders. We need to change tactics, get experts involved, so that we get recognition.

Ravi Duggal: Can cases be filed against erring bureaucrats? How can they be made accountable?

Shyam Diwan: There are public interest litigations against Pollution Control Boards for not doing what they are supposed to do. The legal system is extremely imperfect. One way is by setting up green courts. Courts pass directives, but there is no mechanism to see that they are implemented. The Supreme Court has found that in many states quarrying goes on and saw mills continue to work despite orders against them. One solution for this problem is by issuing notices to Chief Ministers of states where such violations occur and mandate them to make a personal appearance in court to make them realize the seriousness of the violation.

Ramana Dhara: Practicing yoga makes people "feel good". Has it actually helped asthmatics? Have clinical tests been done before and after yoga?

D R Vaze: Our institute has worked with chronic asthmatics. Patients are admitted for 2 months and various tests are conducted. Our experience tells us that certain yogic practices have helped in reducing the frequency of asthma attacks and providing relief to patients, eg, reduction in wheezing. Patient feedback has told us about feedback about the changes

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that occur after discharge. While in hospital, they do their yogic exercises regularly and get relief, but in some cases, they may not be so regular with their exercises after going home.

Is asthma irreversible?

D R Vaze: Asthma cannot be reversed as physical changes that have already occurred. In children, yoga is effective before pathological changes take place in lung and bronchial tissue. Yoga should be started when people are healthy and not when they start having health problems.

CHILDREN'S ASTHMA
Mumbai, 14-15 June 2005

Plenary Session 6 : Synthesizing the Action Agenda and Closing Session

Chair : R Rajamani

Former Secretary, Ministry of Environment and Forests
Government of India

Closing remarks

S K Gupta, Secretary, Indian Association of Air Pollution Control

We have had a good meeting and I wish to thank the organizers, sponsors and all participants of this event for making this workshop such a success. In closing, I wish to make a few points which I feel are worth emphasizing.

1. There is a need to understand:

a. Asthma: what it is and its cause is.

b. Relationship between air quality and occurrence or triggering of asthma.

2. Developing techniques for self-management and local air quality management is important. This may require control of vehicular pollution through reducing vehicular density. Best and viable option is to cut down VKMTPD (Vehicle Kilometer travel per day) in local areas, which may require proper planning of urban sprawl and conveniences near to community habitats. Ultimately reduce dependence on vehicles.

3. There is a need to develop community pressure groups to pursue local government as well as people to implement local air quality management plans.

4. There is a need for setting up local diagnostic centre (preferably free of cost) to detect asthma and other respiratory diseases including ECG, BP, Glucose levels, ENT infection especially in children, women and elderly persons.

5. Lastly, and most importantly, there is a need to develop capability to compute risk and costs due to such occurrences.

Vote of thanks

T Vijayendra, Chairman, Cerana Foundation, Hyderabad.

Let me begin with a personal note. I am an asthma patient and therefore I was looking forward to this workshop. It has been a great experience both in terms of learning, and in interacting with some very knowledgeable and motivated people in this field. The participants have been drawn from diverse fields of medical specialists in respiratory diseases, air pollution experts, urban transport experts, community workers and so on. They came both as individuals and as representatives of institutions representing various disciplines. It is my great pleasure to thank them both personally and on behalf of Cerana Foundation.

I wish to thank the US Environmental Protection Agency for sponsoring this event, and also Indian Association of Air Pollution Control, Central Pollution Control Board, Andhra Pradesh and Maharashtra Pollution Control Boards, National Initiative for Asthma Management, Kaivalyadhama, National Environmental Engineering Research Institute, US Agency for International Development, New York University—Center for Immigration Health, New York City Asthma Partnership, Emory University—Rollins School of Public Health for co-sponsoring this event. I also wish to thank Bombay Hospital for so readily and graciously agreeing to give us the S P Jain Auditorium for this event. Thanks also to all the chairpersons and facilitators of the plenary

and breakout sessions, and to Hunger Busters, who fed us so well. I wish to in particular thank Human Rights law Network, Jana Jagrithi Samithi and Centre for Workers Management for lending us money so that we could run this workshop, and Envirotech Instruments for making a donation for the workshop and Maharashtra Pollution Control Board for offering to make a donation. Lastly, I wish to make a special mention of the very hard work that all our volunteers put in. Thank you Ulhas, Priti, Dev, Sushant, Samyukta, Surabhi, Chirag, Naira, Shonali, Lareena, Hazel and Anisha.

Thank you all once again and have a pleasant and safe journey back home!

CHILDREN'S ASTHMA
Mumbai, 14-15 June 2005

Visit to Gowandi Slums

On 16 June morning, a group of about 20 workshop participants visited the Govandi municipal dump ground and adjacent Shivajinagar and Bainganwadi slums. The group saw the dumping of organic and inorganic waste in the ground, and the burning of some of this waste, including of plastic waste.

Dr Athar Qureshi at the Niramaya clinic briefed the group on the Bainganwadi and Shivajinagar slums that are located adjacent to the municipal dump ground. The visitors were then divided into two groups and were taken around the slums to interview children, school (anganwadi, balwadi) teachers and doctors. Many of the children interviewed worked as rag pickers in the dump ground and were exposed to high air pollution levels. The group was told by those they met that there was a high incidence and prevalence of asthma amongst slum children and adults.

No	Name	Organization	Address	Email	Telephone	Fax
1	Dr B Sengupta	Central Pollution Control Board	Parivesh Bhavan, East Arjun Nagar, New Delhi 110 032	bsg1951@yahoo.com	11-2230 7078	
2	Dr S P Singal	Indian Association for Air Pollution Control	A 271, Okhla Industrial Area, Phase 1, New Delhi 110 020	envirotech@vsnl.com	11-2681 3887	11-2681 1833
3	Mr S K Gupta	Indian Association for Air Pollution Control	A 271 Okhla Industrial Area Phase 1, New Delhi 110 020	envirotech@vsnl.com	11-2681 2607	11-2681 1833
4.	Dr S M Melgiri	Kaivalyadham	43 Netaji Subhash Road, Mumbai 400 002	kdham@vsnl.com	22-2754 2843	22-2281 0494
5	Dr D R Vaze	Kaivalyadham	Lonavala, Pune Dt, Maharashtra 410 403	kdham@vsnl.com	2114-27 3001	2114-27 1983
6	Dr S Katoley	Maharashtra Pollution Control Board	Kalpataru Point, Sion Mantuga Scheme, Rd 8, Sion (E), Mumbai 400 022	skatoley@rediffmail.com	22-2401 4701	22-2402 4068
7.	Dr D B Boralkar	Maharashtra Pollution Control Board	Kalpataru Point, Sion Mantuga Scheme, Rd 8, Sion (E), Mumbai 400 022	mpcb@vsnl.net	22-2401 0706	22-2402 3516
8	Mr P P Nandusekar	Maharashtra Pollution Control Board	Kalpataru Point, Sion Mantuga Scheme, Rd 8, Sion (E), Mumbai 400 022	mpcb@vsnl.net	22-2401 2659	22-2402 4068
9	Dr Rohini Chowgule	National Initiative for Asthma Management	Ward 12, Kasturba Hospital, Sane Guruji Marg, Mumbai 400 011	drrohini@vsnl.com	22-2301 4992	22-2306 2534
10	Dr Rakesh Kumar	National Environmental Research Institute	89-B, Dr Annie Besant Road, Near Worli Flyover, Worli, Mumbai 400 018	drrohini@vsnl.com neeri@giasbm01.vsnl.net.in	22-2301 4992 22-2497 3521	22-2306 2534 22-2493 6635
11	Ms Nutan Zarapkar	US Agency for International Development	American Center, 4 New Marine Lines, Mumbai 400 020	zarapkarnb@state.gov	22-2262 4590	22-2269 1102

No	Name	Organization	Address	Email	Telephone	Fax
12	Ms Krithika Srinivasan	India Centre for Human Rights & Law	4th Flr, CVOD Jain School, 84 Samuel St, Mumbai 400 009	huright@vsnl.com	22-2343 9651	22-2343 3698
13	Mr Debi Goenka	Bombay Environmental Action Group	B 502, Glengate, Hiran Gardens, Powai, Mumbai 400 076	debi@beag.net	98200 86404	22-2242 6385
14	Dr. U. C. Mishra	Health Safety and Evironment Group, BARC	A-402, Govind Complex, Sector 14, VASHI, Navi Mumbai 400 703	ucmishra@yahoo.com	22-2765 6504	
15	Mr Ravi Duggal	Centre for Enquiry into Health and Allied Themes Research Centre of Anusandhan Trust	Survey 2804 Aram Soc Rd, Vakola Santa Cruz E, Mumbai 400 055	ravicehat@vsnl.com	22-2667 3154	22-2667 3156
16	Dr Vivek Monteiro	Centre for India Trade Union	Navnirmiti, Discover IT, Opp. IIT Main Gate, Behind Powai Hospital, Near Municipal School, Powai, Mumbai 400 076	vivekmonteiro@yahoo.com	98693 61602	
17	Mr Percy E Jamshedwala	Dahanu Taluka Environment Welfare Association	B 103 Aastha Enclave, Masoli, Dahanu Road(W.Rly), Maharastra 401 602	percy_kam@rediffmail.com	2528-22 6037	
18	Ms Nergis B Irani	Dahanu Taluka Environment Welfare Association	B 103 Aastha Enclave, Masoli, Dahanu Road(W.Rly), Maharastra 401 602	sunshineirani@hotmail.com	2528-22 2688	
19	Mr Vijay Kanhare	Occupationl Health & Safety Centre	6 Neelkanth Apartments, Gokuldas Pasta Road, Dadar(East), Mumbai 400 914	sujvij@vsnl.com	22-2886 8329	
20	Dr S R Kamat	Retd Professor of Chest Medicine, KEM Medical College, Mumbai	B 2 Dattaguru Cooperative Housing Society, Deonar, Mumbai 400 088	drsrkamat@yahoo.com	22-2556 2611	22-2529 8224
21	Dr. Riddhi Prakash Doshi	Lokmanya Tilak Municipal Medical College	B 6 Kamal Apt., Azad Road, Vile Parle East, Mumbai 400 057	dr.riddhiprakash@gmail.com	98697 24454	

No	Name	Organization	Address	Email	Telephone	Fax
22	Mr Shyam Diwan	Lawyer, Bombay High Court	20 Laburnum Road, Gamdevi, Mumbai 400 007	divan@bom3.vsnl.net.in	98202 91253	
23	Dr Athar Qureshi	Niramaya Health Foundation	309, 2nd Floor, Oswal Bhavan, Tardeo Road, Nana Chowk, Mumbai 400 007	info@niramaya.org	22-2385 1423	22-2385 1405
24	Mr Angus T Simmons	Consul General of USA, Mumbai	Lincoln House 78, Bhulabhai Desai Road, Mumbai 400 026		22-2363 3611	
25	Dr Sukumar Devotta	National Environmental Research Institute	Nehru Marg, Nagpur 440020	dirneeri_ngp@sancharnet.in	712-2224 9999	712-222 4990
26	Mr Amit Chauhan	National Environmental Research Institute	89-B, Dr Annie Besant Road, Near Worli Flyover, Worli, Mumbai 400 018	neeri@giasbm01.vsnl.net.in	712-2224 9999	712-222 4990
27	Mr P Prakash	Integrated Rural People Welfare Association	Manthinavalasa Colony, Kurupam, Vizianagaram Dt.	asha_prakash2004@yahoo.co.in	94401 06905	
28	Mr V Siva Sankara Rao	Rakshana	22-15-24, Thomaspet, Chirala, Prakasam Dt 523 155	rakshana_in@rediffmail.com	8594-23 3453	
29	Mr Konda Lazarus	CAMP	G.B.C. Road, American Hospital Compound, Ponnur, Guntur Dt, AP	camp_ponnur@yahoo.com	8643-24 6635	
30	Mr S K Mastan	SARDS	Janachaitanya Nilayam, Kodepi Road, Tangutur, Prakasham Dt	sards@rediffmail.com	98483 56452	
31	Mr R Rajamani	Former Secretary, Forests, Ministry of Environment & Delhi 8-2-585\A\1,	Road No 9, Banjara Hills, Hyderabad - 500 034	rraja9@vsnl.net	40-2335 8320	40-2335 5480
32	Mr S Nagabrahma chary	M Venkatarangaiya Foundation	Plot no 338, Road No 5, Vaidehi Nagar, Vansthalipuram, Hyderabad 500070	mvfindia@mvfindia.com	40-2424 1574	

No	Name	Organization	Address	Email	Telephone	Fax
33	Ms Bedoshruti Sadhukhan	Human Rights Law Network	EJ1, Human Rights Law Network, 65 Masjid Road, Jungpura, Bhogal, New Delhi 110 014	slicdelhi@vsnl.net	11-2431 9855	
34	Mr Paritosh Tyagi	Former Chairman, Central Pollution Control Board, Delhi	48 B, Green View Apartments, Sector 15 A, Noida, UP 201 301	paritya@vsnl.com	120-251 3135	120-251 1708
35	Mr. Satish Sinha	Toxics Link	H 2 Jungpura Extn, New Delhi 110 014	satish@toxicslink.org	11-2432 8006	11-2432 1747
36	Dr T K Joshi	Center for Occupational & Environmental Health	B L Taneja Block (Grd Flr), Lok Nayak Hospital, New Delhi 110 002	joshitk@vsnl.com	11-323 3519	11-321 4731
37	Mr Balakrishna Shetty	Janajagrithi Samithi Nandikur	Nandikur, Udupi Dt, Karnataka 574 138	shettyin@eim.ae	820-255 5078	820-257 7333
38	Dr. B. R. Bala gangadhar	Karnataka State Pollution Control Board	Nirman Bhavan, Dr Rajkumar Rd, Rajajinagar, Bangalore 560 010	balu_begur@lycos.com	80-2357 8458	
39	Mr Cyril Fernandes	Goa Shipyard Kamdar Ekvott	G 1, Block B, Island View Apts., Alto-Chicalim, Mormugoa, Goa 403 711	gslgske@yahoo.com	94224 46139	
40	Dr S K Bhargava	Industrial Toxicological Research Centre	Mahatma Gandhi Marg, Post Box 80, Lucknow 226 001	bhargavask@sify.com	522-261 1547 522-2620107	522-262 8227
41	Dr Rajesh Kotecha	Chakrapani Ayurveda Clinic & Research Center	A 33, Prabhu Marg, Tilak Nagar, Jaipur 302 004	drrajesh@ chakrapaniayurveda.com	141-262 4003	141-262 0746
42	Ms Ameesha Mehta Sampath	Environmental Protection Agency	EPA Region II: DEPP-RIAB, 290 Broadway, 26th Floor, New York, NY 10007 USA	Mehta-Sampath.Ameesha@ epamail.epa.gov	212-637 4006	212-637 4942
43	Ms Maureen O'Neill	Environmental Protection Agency	EPA Region II: DEPP-RIAB, 290 Broadway, 26th Floor, New York, NY 10007 USA	ONeill.Maureen@ epamail.epa.gov	212-637 5025	212-637 4943

No	Name	Organization	Address	Email	Telephone	Fax
44	Dr Ted McDonald	U.S.Environmental Protection Agency	Office of International Affairs (2676R), 1200 Pennsylvania, Ave., N.W., Washington, D.C. 20460 USA	MacDonald.Ted@epa.gov	202-564 6114	202-5645 2411
45	Dr Ramana Dhara	Rollins School of Public Health, Emory University	3200 Hampton Ridgeway, Snellville GA 30078 USA	vdhara@sph.emory.edu	770-985 0435	770-985 0435
46	Dr Louis Calcagno	New York City Dept of Transportation	59 Maiden Lane, 35th Floor, New York, NY 10038	lcalcagno@dot.nyc.gov	212-487 6820	
47	Ms Jacqueline Fox-Pascal	New York City Dept of Health and Mental Hygiene	2 Lafayette Street, 20th Floor, New York, NY 10007	jfox@health.nyc.gov	212-676 2575	212-676 2161
48	Ms Sapna Pandya	South Asian Health Initiative, New York University School of Medicine	550 1st Ave, OBV, C&D 402, New York, NY 10016	sapna.pandya@med.nyu.edu	212-263 8246	212-263 8234
49	Mr Sudhakar Malpe	Global Center for Prevention of Diseases	52/B Mittal Court, Nariman Point, Mumbai 400 021	gcpd@vsnl.net	22-5625 7576	22-2282 6376
50	Ms Mehjabin M S Rizvi	Committee for Right to Housing	5 Besant Road, Santacruz (West), Mumbai 400 007		93227 89312	
51	Mr Michael Fisher	Engineers for a Sustainable World, Berkeley	Mechanical Engineering Department, University of California, Berkeley. California USA	mbfisher@gmail.com	98670 92333	
52	Ms Erin E. Inglish	Engineers for a Sustainable World, Berkeley California USA	Mechanical Engineering Department, University of California, Berkeley.	eei@berkeley.edu	98670 92333	
53	Ms Goutami Anant Pole	Cama & Albless Hospital	Mahapalika Marg, Mumbai 400 001		22-2261 1667	
54	Ms Leela M Deshmukh	Cama & Albless Hospital	Mahapalika Marg, Mumbai 400 001		22-2261 1226	
55	Ms Sunitha S Nayak	Sion Hospital	B 10, Mahavir Villa, Plot No 119-120,Ghatkopor, Mumbai 400 077	sunitha_nayak13@rediffmail.com	22-2506 4289	

No	Name	Organization	Address	Email	Telephone	Fax
56	Dr Amiya Kumar Sahu	National Solid Waste Association of India	25 Unique Industrial Estate, Veer Sarvarkar Marg, Prabhadevi, Mumbai 400 025	econpcpli@vsnl.com	22-2566 0348	22-2566 0348
57	Dr G K Pandey	Ministry of Forests and Environment	Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi 110 003	pandey@menf.delhi.nic.in	11-2436 0467	11-2436 0467
58	Dr Manoranjan Hota	Ministry of Forests and Environment	Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi 110 003	hota@nic.in	11-2436 0467	11-2436 0467
59	Dr Sundeep Salvi	Chest Research Foundation	Marigold Premises, Survey No 15, Kalyani Nagar, Vadgaon Sheri, Pune 411 014	crfpune@vsnl.net	20-703 5361	20-703 5371
60	Mr Sagar Dhara	Cerana Foundation	D-101 Highrise Apts, Lower Tank Bund Rd, Hyderabad 500 080	sagdhara@yahoo.com	40-2753 6128	40-2753 6128
61	Mr T Vijayendra	Cerana Foundation	D-101 Highrise Apts, Lower Tank Bund Rd, Hyderabad 500 080	vijayendrat@yahoo.com	40-2753 6128	40-2753 6128
62	Ms Yamini Dalvi	Individual	Sagar City, Indian Ocean, B Wing, Flat No 1404, SV Road/SP Road Andheri West, Mumbai 400 058		22-5576 7394	
63	Ms Kalpana Sharma	The Hindu Mumbai	Jamshedji Tata Road, Nariman Point, Mumbai 400 020		22-2284 5903	22-2202 5415
64	Ms Meena Menon	The Hindu Mumbai	Jamshedji Tata Road, Nariman Point, Mumbai 400 020		22-2284 5903	22-2202 5415
65	Ms Lalitha Vaidyanatham	PTI Mumbai				
66	Mr Roshan Balakrishna	Mirror Mumbai				
67	Mr S K Iyer	Gulf News Mumbai				
68	Mr Ravindra Kumar	India Post Mumbai				

No	Name	Organization	Address	Email	Telephone	Fax
69	Mr Rajendra Jadhav	Indian Mass Media Coop. Mumbai				
70		Times of India, Mumbai	Mahapalika Marg, Mumbai 400 001			
Volunteers						
71	Mr Sushant Raut		21 Dossa House, 5 Gunbow Street, Fort, Mumbai 400 001	sushantraut@rediffmail.com		
72	Mr Chirag Dhara		5-Vikas, Dadabhai Road, Andheri West, Mumbai 400 058	uroblitz84@yahoo.co.in	22-2670 4270	
73	Mr Devadatta Tengshe		205, Shriniwas-II, L I C Colony, Borivali (West), Mumbai 400 103	dev3is@gmail.com		
74	Ms Samyukta Muralidharan		25/295, Sahakar Nagar 1, Chembur, Mumbai 400 071	samyukthamuralidharan@yahoo.com		
75	Ms Surabhi Gaikaiwari		Gap@no.160, Jiveshwar temple, Khollapur Road, Ichalkaranji 416 115	surabhee_g@yahoo.com	230-242 3585	
76	Ms Lareena D'Souza		B-307, Raj Tower, IC Colony, Borivali West, Mumbai 400 013	lara_z2001@yahoo.co.in		
Reporters						
77	Ms Hazel D'Souza		B-307, Raj Tower, IC Colony, Borivali West, Mumbai 400 013			
78	Ms Anisha Kundu		7 DD Mani Towers, 31/41 BB Road, Calcutta 700 038	anisha84@hotmail.com		
79	Ms Naira D'Souza		7 Darcy Cottage Annexe, 221 Cadell Road, Mahim, Mumbai 400 016	naira_dsouza@hotmail.com		
80	Ms Shonali Kundu		7 DD Mani Towers, 31/41 BB Road, Calcutta 700 038	sensational_shonali@hotmail.com		

Indoor Air Pollution in a Rural Indian Home

Children in a Western City exposed to Vehicular Pollution

Municipal Waste Dump at Gowandi, Mumbai

Cerana
FOUNDATION
D-101, Highrise Apartments,
Lower Tankbund Road, Hyderabad-500 080.
Telefax: +91 40 2753 6128